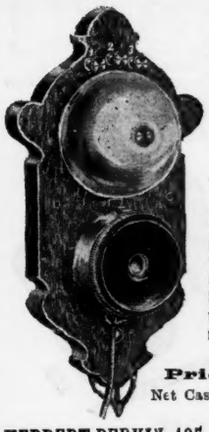
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIV. No. 1886.] LONDON, JULY 4, 1899. [51ST YEAR. PRICE 6d.

STENTOR TELEPHONES.



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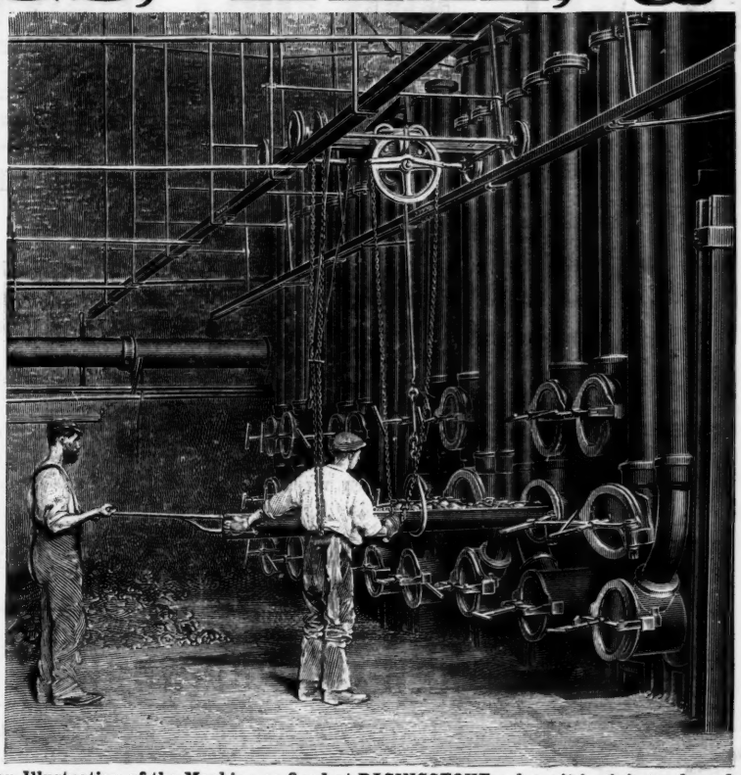

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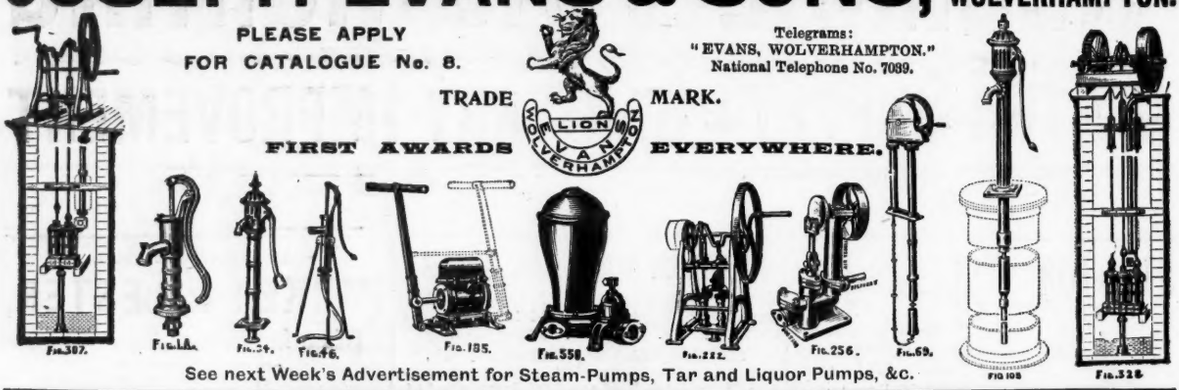

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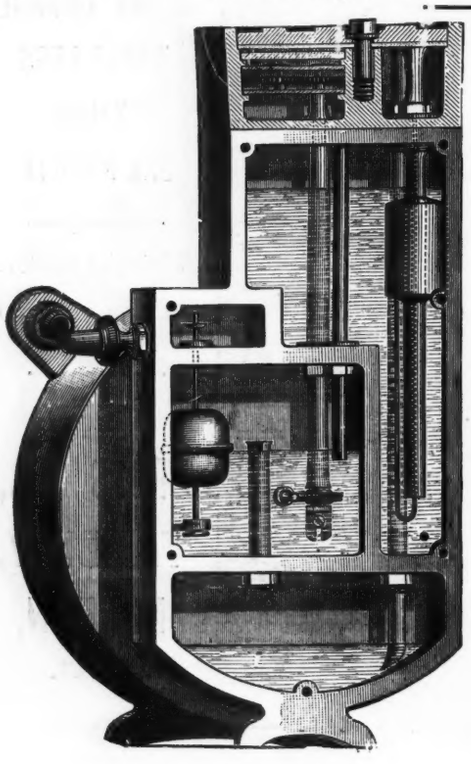

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Has been designed to obviate that which has hitherto prevented the general adoption of underground Meters—namely, their serious cost. No box is required; and the saving thus effected as compared with ordinary underground Meters, where either a box or meter-pillar is necessary, is fully one-half. The price of one for three lights is 28s.; and the other sizes are correspondingly cheap. When fixed, the only part of the Meter exposed to view measures 6½ inches by 3½ inches. By the Indicator with which the Meter is fitted, the Inspector can at once discern whether water is required; but as the Meter is of the compensating description, water will probably need only be supplied ONCE A YEAR. It is advisable to fill the Meter with a non-freezing liquid which does not injure the fittings; and this can be supplied at about 1s. 3d. per gallon.

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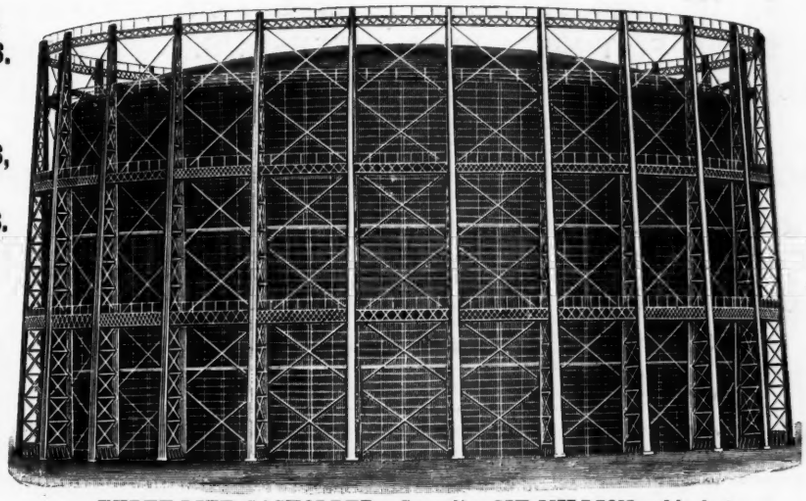

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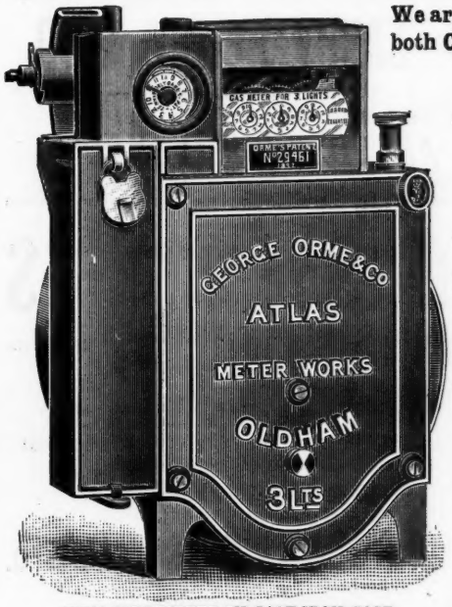

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A large number of these Meters are in use, and giving satisfaction.

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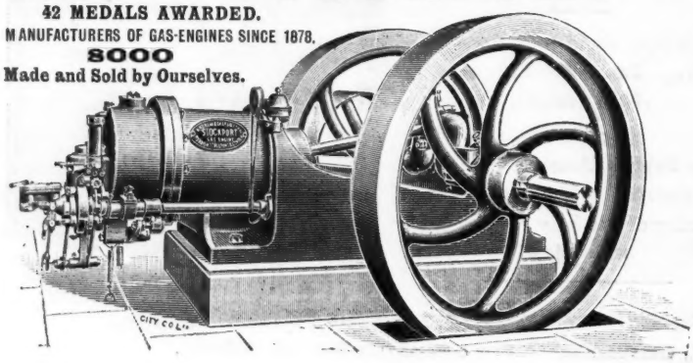

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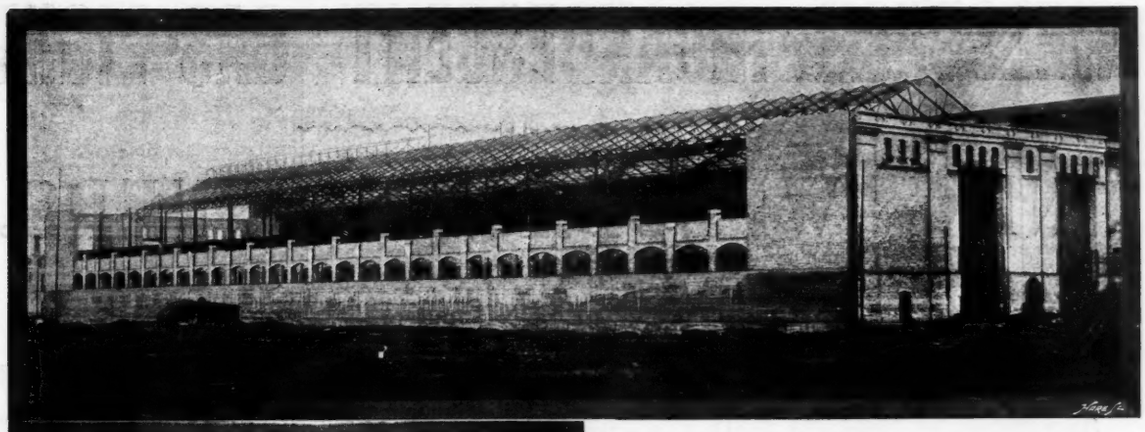

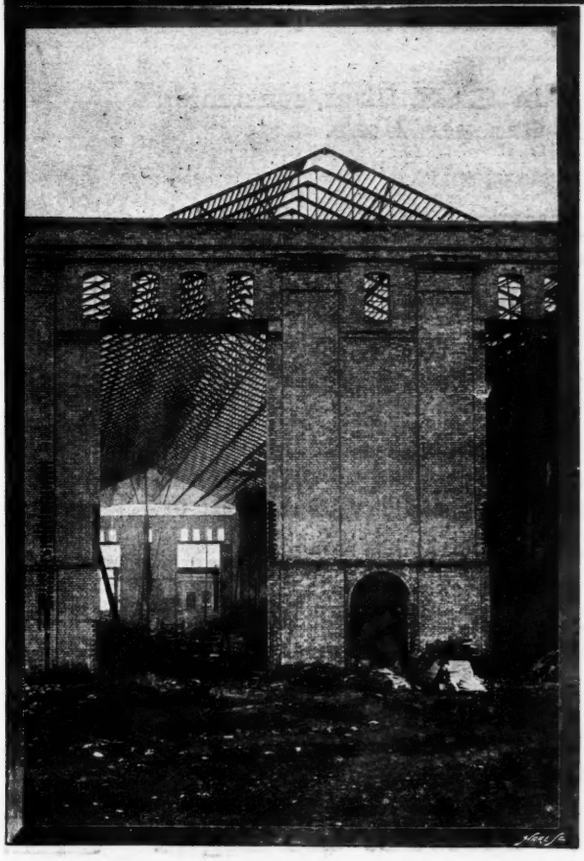

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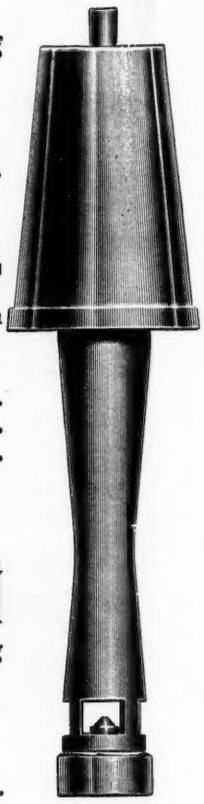
25 Candles per Cubic Foot of Gas.

For STREET LIGHTING there is nothing to excel the New Welsbach Burner as shown at Niagara Hall, London, and in the principal Provincial Towns.

The New Welsbach Burner is supplied in SIX Sizes, consuming from ¾ to 7 Cubic Feet of Gas per Hour.



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To obtain a light of 100 Candles for 4000 hours with Gas at 2s. 3d. per 1000 Cubic Feet would cost—

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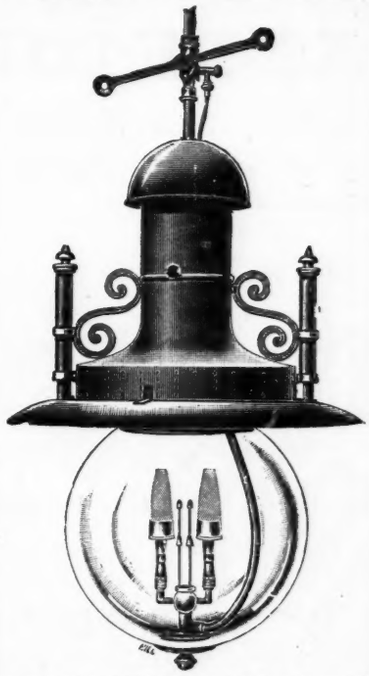

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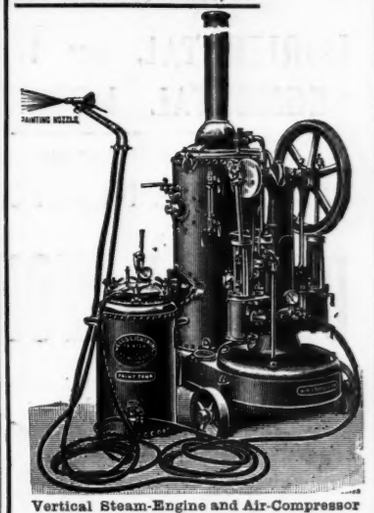

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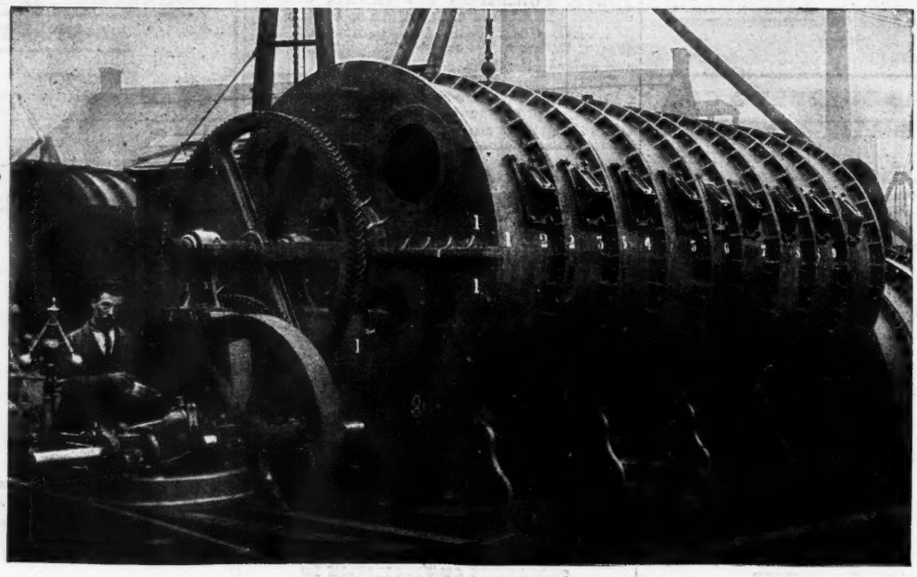

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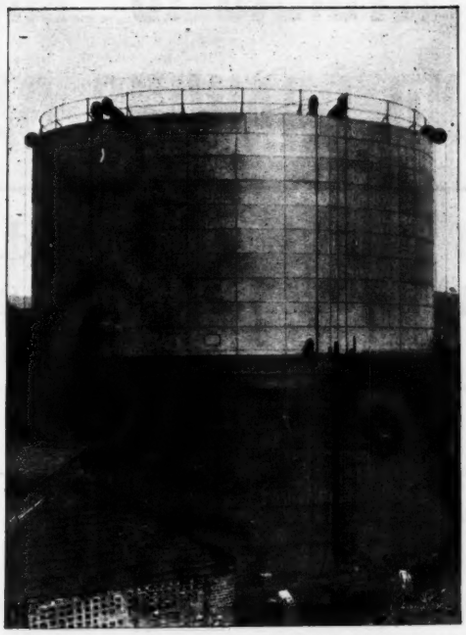

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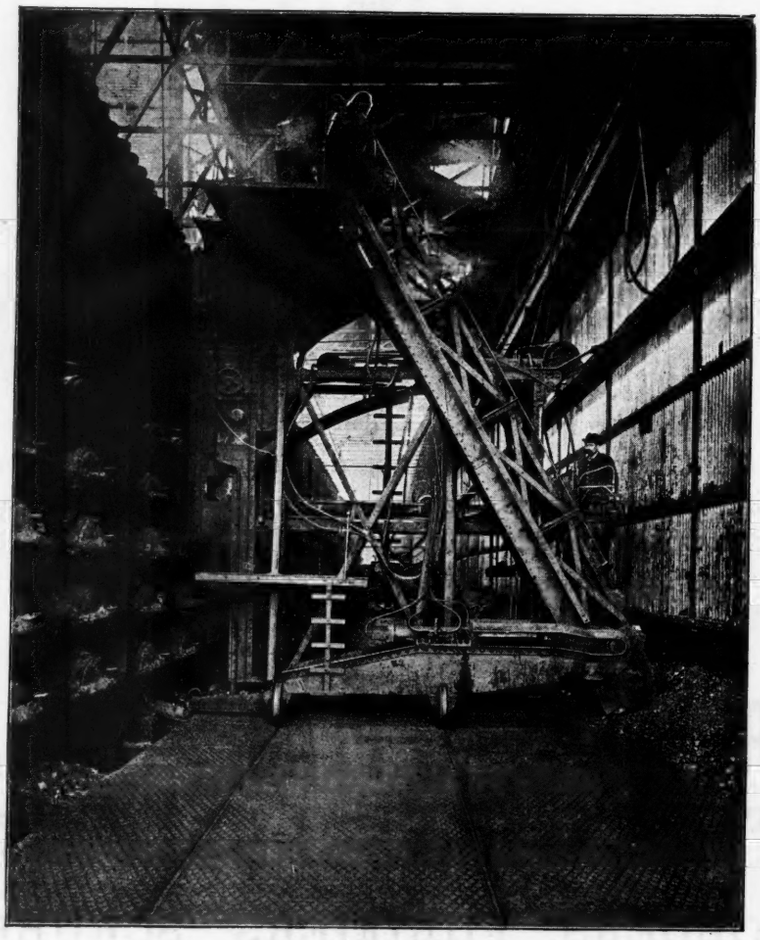

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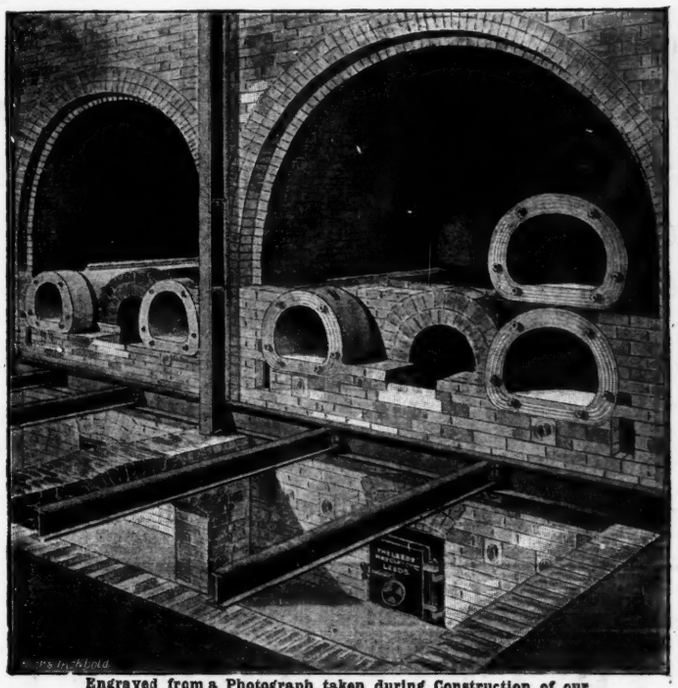

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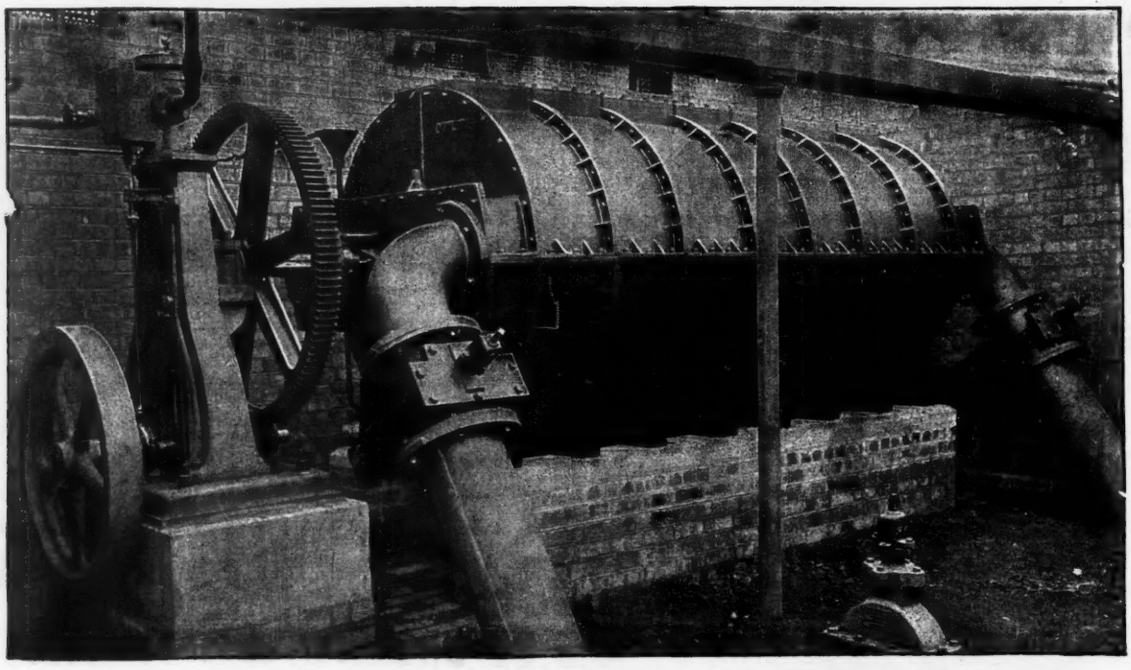

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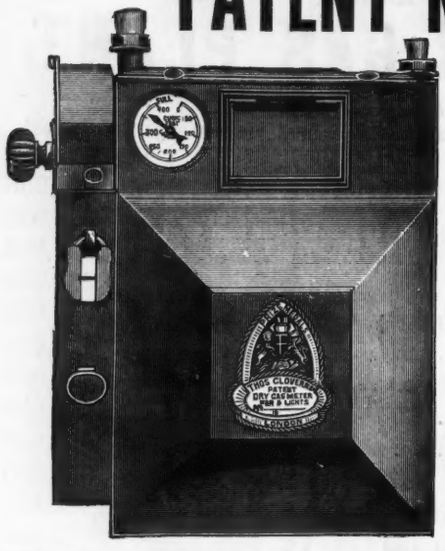

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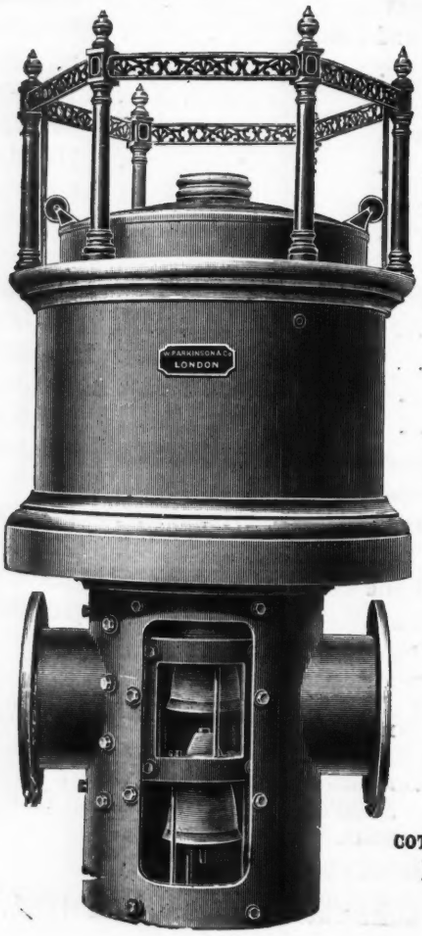

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EDITORIAL NOTES.

Rejection of The Gaslight and Coke Company's Bill—The "Powers of Charge" Committee.

LAST week's dealings by Parliament with the Metropolitan Gas Question were distinctly sensational. The Gaslight and Coke Company's Bill came before the Lords' Committee simultaneously with the continuation of the inquiry by Sir J. Rankin's Committee; and, after a brief hearing, their Lordships threw out the Bill. Unquestionably, the House of Lords is "going strong" this session. The Lords' Committees have shown themselves much bolder than those of the Commons in making precedents; but it may well be doubted if either House has ever taken a stronger action against a statutory gas company than this summary rejection of a Money Bill without taking evidence in opposition. The action of the Lords' Committee overshadows what remains of the general inquiry, and is certainly the rudest shock that the Horseferry Road administration could have received. Although the Commons' Committee had reduced the amount of new capital to be authorized by the Bill from £3,500,000 to £2,500,000, the smaller sum would have sufficed to keep the Company out of Parliament for many years, and so have enabled the present administration to snap their fingers at any finding of Sir J. Rankin's Committee. This was, indeed, the whole case against the Bill, as put by Mr. Littler, Q.C., for the Corporation of the City of London; and it proved sufficient.

The proceedings of the Powers of Charge Committee during the two days' sittings were comparatively dull and uneventful. Colonel Makins, Governor of The Gaslight and Coke Company, tendered himself as a witness for the Board of Directors, who have been charged with incompetence and incapacity. He met this grave accusation by handing in certificates of character and service, so to speak, for himself and his colleagues. Naturally, Colonel Makins put the criticisms of Mr. Livesey down to personal animosity on his part, inspired by rancour over the notorious Nine Elms case. As to the fact of the comparative dearness of gas north of the Thames, Colonel Makins assigned it to "capital and rates," which he declared to be outside the control of the Directors and the management. It is quite a small point; but we notice that, with his habitual liking for a smart hit, even if it is a little "below the belt," Colonel Makins managed to work into his statement a description of the "JOURNAL" as "Mr. Livesey's organ." As there is no knowing how far this assertion may travel, or how it may be understood by those who are not acquainted with the truth of the matter, we must take this opportunity for stating that if Colonel Makins meant by his observation to get the Committee to believe that Mr. Livesey owns the "JOURNAL," or has the smallest proprietary interest in it, he was entirely in error. This is the obvious and natural interpretation of Colonel Makins's expression; and it is absolutely without justification in fact. That it does frequently happen for the "JOURNAL" editorials to be in accord with the acknowledged head and master of the craft of which we claim to be the journalistic voice, is a circumstance to be proud of, from our point of view; but that this agreement upon various questions of the day constitutes the "JOURNAL" the "organ" of Mr. Livesey, we flatly deny. To the best of our knowledge, Mr. Livesey has never written for publication a line that he did not sign. He certainly has not, nor ever had, any voice in guiding the policy of the "JOURNAL." As well might this periodical be termed the "organ" of one of Colonel Makins's colleagues—Mr. Corbet Woodall—upon the strength of our general agreement with this eminent consultant's parliamentary and other professional views. But, as already remarked, the point is a small one—which is perhaps the reason why it came so handy to Colonel Makins, who was in the awkward predicament of having to rebut one explanation of admitted facts of far greater importance, without being able to supply a more convincing one. Colonel Makins's statement was very long; but it may be summed up by saying he owned that he and his colleagues had declined to take Mr. Livesey seriously, and that the Company could not reduce the price of gas to the South Metropolitan level and make both ends meet. Mr. Field was further examined; and the Committee wrestled with the familiar difficulty of trying to "prove a "negative"—that the business of The Gaslight and Coke Company has not been well done—under the disadvantage of having to do with testimony otherwise inspired. Colonel Makins and Mr. Field, in short, professed to be supremely satisfied with the actual condition and prospects for the future

of The Gaslight and Coke Company in their hands. The loss of their Bill must, however, put a different complexion upon some things in this connection.

A Year's Working of the Workmen's Compensation Act.

It is with much pleasure that we are able to shake hands with our contemporary the "Engineer," over the complete justification of the view of the expense of working the Workmen's Compensation Act which the "Journal" took from the first, in agreement with the "Engineer." When some nervous people were in a great state of flutter over the exaggerated premiums for insurance under the Act demanded by the Associated Offices, we advised the timid ones to keep a quiet mind, and wait to see how things developed, before consenting to these exorbitant demands. Now, as our contemporary remarks, the much-discussed Act has been in force exactly one year. Although a quinquennium is the basis of the actuarial computations of Insurance Companies, an experience of one year is good enough for ordinary business men to ascertain how a new order of risk is likely to work out. Of all the employments covered by the Act, the execution of engineering works is one of the most hazardous to individual life. It is not that this employment is subject to such wholesale catastrophes as those which oppress the popular imagination in connection with coal mining; but all superintending engineers know that few big jobs are carried through without loss of life or limb, on however small a scale. This time last year, the Associated Offices would not take engineering works at less than 30s. per £100 paid in wages. Gas-works were in nearly as bad repute. Now we learn that renewals of policies for another year, for engineering works, are being taken at 5s. per £100. This is more as it should be; but the big Insurance Offices of this country, whose blundering caused such a scare a year ago, ought to be ashamed of themselves for not knowing their own business better.

The thanks of the gas undertakings of the North of England are due to the enterprising Honorary Secretary of the local Association of Gas Managers—Mr. Penney, of South Shields—who has stoutly contended for the inclusion of the gas-works of the district in the 5s. rate, and has gained his point. In the light of experience, the discussion of the Act at the Belfast meeting of the Gas Institute reads like talk "in the air." Yet it is satisfactory to find that the more moderate estimates then put forward of the value of the risk in the case of gas workers have been justified. The original demand of the Tariff Offices for 25s. per £100 of wages paid, frightened off the big Gas Companies; while the smaller undertakings paid for the first year, in several instances, more than they thought reasonable, in order to be on the safe side. A five-shilling rate will not hurt anybody; while the fact of being insured will tend to tranquillize the mind of the average gas manager. It is quite clear that Offices which will not admit gas-works at this rate are simply out of the business. At the same time, it would be rash to assume that any Company offering to insure at this rate is to be trusted. It is one of the worst consequences of the blunder of the Tariff Offices that their action left the way open for a number of more speculative concerns to extend their operations. It is somewhat inhumane to say that one would like to see how these Companies would stand affected by a series of heavy claims. Of course, we do not welcome the idea of such industrial disasters as would go to the making of these demands, and hope instead that the occasion will never arise. But business is business; and it is impossible to give any Insurance Company a clear character until experience has been had with it in both kinds. It is one thing to build up a huge connection by virtue of exhibiting "liberality" in offering terms; but how are claims met? On the whole, we are inclined to adhere to our old counsel in this matter—that gas undertakings of any size had better take their own risk under the Workmen's Compensation Act. Whether small works would be well advised to do the same, or had better join with others in getting insured, is a matter of opinion. The chief, and most gratifying, fact of the position is that the working of the Act has not developed any of those terrible things which were spoken of as possible, and even probable, a year ago.

The Corporation of Warrington play at "Tammany."

Those who object to the modern craze for the extension of municipal trading on the ground, among others, that it tends to encourage illicit practices in the supposed interest of the Local Authority, regarded as distinct from that of the public, will be confirmed in their opinion by a special report from the Select Committee on Police and Sanitary Regulations Bills, on the Warrington Corporation Bill. The facts are simple. The Warrington Corporation have a Bill in Parliament, which they promoted in the regular way. In order that there might be no hitch in the usual preliminaries, the Town Clerk was instructed to obtain extra assistance for taking the poll; and he told the Select Committee that he employed "two political agents" for this purpose. It was suggested to the Committee, on behalf of the local Ratepayers' Association, that these agents were paid by the result. The Ratepayers' Association were endeavouring to stir up public feeling against the Bill; and the story goes that the Corporation, in order to make sure of a majority in favour of their measure, paid out of the public funds for canvassers to follow up the constables who distributed the voting-papers and see that the poll came right. The accusation of indulgence in improper practices went further, and alleged that the paid canvassers relieved the ratepayers of the trouble of filling up the papers. This was distinctly denied by the Town Clerk; but, all the same, there was a majority on the poll of 7000 for the Bill. The Select Committee who heard the evidence on this point, took a very serious view of the action of the Corporation. They reported that it had been proved that the Corporation of Warrington, being promoters of the Bill, had "used the money of the ratepayers in the "employment of political agents, for the purpose of influen-"cing the electors in favour of the promotion of the Bill, and "had entrusted the supervision of the taking of the poll to "the persons employed to promote the Bill." The Committee further stated that, while they were not prepared to visit this abuse of the powers of the Corporation by rejecting the Bill, seeing that all the provisions of the Borough Funds Act had been complied with, so that the costs would fall upon the ratepayers, "they wish, nevertheless, to record "their emphatic disapproval of the employment of such "measures." There was no need to convict the paid canvassers of actual malpractices.

It is very easy to put a Municipal Corporation in the pillory for a trick of this kind. The Parliamentary Committee were bound to take notice of the proceeding, and to condemn it. There is no reason to suppose that the Corporation of Warrington knew they were doing anything wrong in trying to get a satisfactory poll; but the long and the short of the matter is that this sort of thing is "Tammany." Where it goes on, the Corporation is the "machine," which must be worked somehow, upon the lines favoured by the party in control for the time being. There is no putting any decided limit to mischief of this order, when once admitted. Rather than vilify the Corporation of Warrington, we would call in question the value of the Borough Funds Act. There is no more fruitful incentive to corrupt practices than a statute which must be kept in the letter, but which does not meet the real necessities of the case. It is agreed on all hands that the Borough Funds Act is obsolete. It does not really prevent municipal recklessness in the matter of promoting and opposing Bills, at any rate in the case of the large towns; while its costliness is in direct ratio with its ineffectiveness. The Association of Municipal Corporations wish to get rid of the Act altogether; but the example of the only Local Authority in the United Kingdom who can go to Parliament of their "own sweet will"—the London County Council—is not encouraging in this regard. Still, rather than have the existing sham protection perpetuated, it would be better to throw the full responsibility upon the members of local authorities, with reasonable safeguards for publicity and ample consideration. The question is a difficult one; but the case of Warrington should press it on for rational treatment.

Gas Inquiry at Ossett.

There is a strong antiquarian flavour about such proceedings as those terminated at the last West Riding Quarter Sessions, in which the Ossett Gas Company figured as the defendants against a petition for an investigation of accounts, under section 35 of the Gas-Works Clauses Act, 1847. The petitioners obtained their inquiry; and it was reported by the examining Accountant that the Company had committed various irregularities—the most serious being the payment of income-tax for shareholders, and non-investment of the reserve fund. For the Gas Company, it was argued that the real object of the proceedings was not to benefit the gas consumers, but to ascertain the lowest figure at which the Corporation might expect to be able to buy the undertaking. There was no denying the illegal payment

of the income-tax; but the fact of the non-investment of the reserve fund was set up successfully as a bar to the ordering of a reduction of price by the Court. The ruling case which governed the finding of the Court on this point was the familiar one of *Regina v. Recorder of Hanley*. It seems peculiar that a default under one clause of an Act should be a valid defence to proceedings taken under another. Clause 31 of the Act of 1847 orders that reserve funds should be invested; but the direction seems to be as inoperative as Dogberry's instruction to the Watch. The West Riding Bench marked their sense of the Company's administration by ordering them to pay all the costs of the proceedings and the inquiry. Thus the Company are made to suffer; but it is scarcely to be expected that the Corporation will rest satisfied with their legal triumph.

Government Departments or Boards.

THE President of the Incorporated Association of Municipal and County Engineers is dissatisfied with the Local Government Board. This may be most serious! The gentleman in question—Mr. W. Harpur, of Cardiff—devoted a considerable portion of his Inaugural Address to the Institution to a criticism of the ways of this egregious Department, which seems to exist for the purpose of troubling the peace of Municipal Sanitary Authorities. The gist of Mr. Harpur's complaint is that practical sanitary science has to be worked out by the authorities of the large cities and towns as they go along. In other words, there is no such thing as a settled body of sanitary doctrine; but from time to time the local authorities charged with the duty of looking after the public health find it necessary to take fresh orders in regard to the disposal of pressing matters. Then they find themselves in opposition to the Local Government Board, who apparently have a difficulty in understanding why Cardiff, for instance, cannot rest content with following the fashion set by other places. There is much force in this complaint. The action of a Government Department is usually that of a drag upon the wheel of progress. By the time a certain line of sanitary practice has become familiar to the Department, somebody has exploded it and suggested something different; and the whole cumbrous machine has to be swung round and started in a different direction, while Assistant-Secretaries, Inspectors (R.E.), and Medical Officers toil panting after the daring innovator. Mr. Harpur is so impressed with the remarkable rigidity of the Local Government Board, that he darkly surmises whether there is such a body at all, because no consultative body could possibly be so stubborn and hard to touch. The suggestion signalizes his innocence. Of course, there is not any Local Government Board, in the ordinary meaning of the term, any more than there is a Board of Trade. The name is a palpable misnomer. When Mr. Joseph Chamberlain was President of the Board of Trade, he was more than once bold enough to joke publicly on the subject of his mythical colleagues, of whom the Archbishop of Canterbury is supposed to be one, by virtue of his office. Mr. Harpur thinks it would be better to have a real Board, while the name remains; and he suggests that such a Board might be an elected body composed of men who had been trained by long service in the great Municipalities of the country. "Such a Board would always be in entire "sympathy with the progressive aims and aspirations of "municipal and county public life." Is he quite certain of this? To change the actual Local Government Board for an elective Board, might be to go from King Log to King Stork; while it is by no means clear that a collection of superannuated town surveyors would prove more responsive to the changing needs of the time than a nominal Department whose head is in Parliament. Our National Boards are odd, illogical institutions, which would never be tolerated in any other country; but somehow they answer very well, as a rule. Properly regarded, they are a means for bringing the great public service of the country under immediate parliamentary control; and he would be a bold man who should undertake to prove that the system had better be radically changed. As a matter of fact, the Local Government Board is the House of Commons acting for a particular purpose through a permanent organization; so is the Board of Trade. To substitute an elective Board for either Department would be a very questionable improvement.

The Congress of the Sanitary Institute is to be held this year at Southampton. There will be three Sections; and that of Physics, Chemistry, and Biology will be under the presidency of Professor Percy F. Frankland, F.R.S.

WATER AND SANITARY AFFAIRS.

IT seems to be the fate of the East London Water Company that their work as an undertaking supplying one of the most important necessaries of life should be beset with difficulties. After the trouble experienced last year in maintaining their supply in a time of exceptional drought, the Company determined on applying to Parliament for authority to construct two large storage reservoirs in the Lea Valley, and, with the sanction of the Local Government Board and the Conservators of the Thames, to draw an additional 10 million gallons of water daily from the river in cases of exceptional drought and other emergency. These, one would have naturally supposed, were highly necessary measures in view of the condition of things prevailing in the Company's district last year. But it was only after a struggle that they passed safely the ordeal of an inquiry by a Parliamentary Committee, although the Chairman—Sir Joseph Pease—was singularly well fitted for the position, by previous experience of the London Water Question. Of course, the London County Council opposed; and the Chairman was addressed privately by the Local Government Board, who considered that the Bill would not be necessary if the measure introduced by the Government to effect intercommunication between the Companies' distributing systems became law. Furthermore, the Committee themselves were reminded of an instruction which was given to a similar body three years ago, to restrict the grant of fresh powers to matters absolutely urgent, and to confine to special purposes the application of fresh capital. As pointed out at the time, these things seemed to threaten the existence of the measures, which were strenuously opposed by the London County Council. Sir Alexander Binnie, their Chief Engineer, could not but acknowledge that the experience of the past year was altogether exceptional; but he expressed the opinion that the intercommunication scheme of the Government was adequate to meet existing requirements; and, this being so, he could not regard the works proposed by the Company as urgently necessary. The Committee chafed a little under the dictation of the Local Government Board; but they did not stand on their dignity. In the result, they passed both of the Company's Bills, consolidated them, and granted the additional capital asked for, subject however, to the provision of the sinking fund. In this condition the Bill went to the Upper House.

It was a foregone conclusion that the County Council would not be satisfied with the decision of the Commons' Committee, and would renew their efforts to get it reversed in the House of Lords; and, as will be seen by the report which appears elsewhere, those efforts were successful. The Bill, on the 23rd ult., came before a Select Committee presided over by Lord Brougham; and the case in support of it was ably submitted to them by Mr. Pember, who pointed out that the Company simply asked for authority to complete the scheme of reservoirs in the Lea Valley which had received the approval of Lord Balfour's Commission. They proposed to spend a million of money, not, as suggested by some of the opponents, on the construction of works to cope with a "remote con-"tingency," but to meet such conditions as those which obtained last year, and which gave rise to a general condemnation of the Company for the inadequacy of their works. Furthermore, they wished to have permission to draw additional water from the Thames, on any emergency arising, subject to the consent of the Conservators and the sanction of the Local Government Board. If these proposals had been sanctioned, the Company's storage would have been raised to a total of 7500 million gallons. Pending the completion of the reservoirs—one in three years and the other in seven more—the additional supply from the Thames would have been available to prevent a repetition of the trouble experienced last year. But, of course, the scheme did not square with the policy of the London County Council, who, as Mr. Pember put it, really asked the Select Committee to adjudicate upon the question of "Wales *versus* the Thames Valley and the Lea."

Ample engineering evidence was adduced in support of the Bill. The Company's Chief Engineer and responsible adviser (Mr. W. B. Bryan) pointed out that the reservoirs which it was proposed to construct would give the Company additional storage to the extent of some 5300 million gallons. Mr. James Mansergh, who, as a member of Lord Balfour's Commission of 1892-3, spoke with more than

ordinary authority, considered the reservoirs were necessary, even if the Welsh Scheme of the London County Council were carried out; and he urged that the sources at our doors should be always utilized. Mr. G. H. Hill, another member of the Commission, characterized the scheme as a sound one, inasmuch as it carried out the principle enunciated by Mr. Mansergh, of making use of the water at hand—water of which a large quantity would still run to waste, even if the proposed works were built —before going farther afield. Mr. E. M. Eaton testified that only adequate storage was necessary to catch every drop of rainfall in the Lea Valley, except what was absorbed by vegetation and evaporation. Sir F. Bramwell compared the scheme, for simplicity, with the one now being carried out at Staines, and said that, in bringing it forward, the Company were only following up the recommendation of Lord Balfour's Commission. Sir Frederick supported the principle of utilizing available sources of water near at hand rather than going to distant places for fresh supplies; and to allow the water in question to run away, he characterized as "wicked waste." Mr. Walter Hunter, the Engineering Director of the Grand Junction Water Company, and one of the Engineers of the Staines scheme, told the Committee that at present his Company could render the promoters very little assistance; but they would be able to do so if the proposals in the Bill were granted.

This was the drift of the evidence in support of the Bill. What were the objections raised by its principal opponents? To a certain extent they were foreshadowed by some questions put by the Chairman (Lord Brougham), early in the inquiry, as to the scope of the Government measure. Mr. Baggallay, for the promoters, explained that the Act in question would only enable a Company having any surplus water to assist another who happened to be short; and he pointed out that some of the Companies had no margin whatever. This reference to the Intercommunication Act by the Chairman seemed to indicate the presence in his Lordship's mind of an idea that the Act would provide all the relief that the Company required. And this was the basis of Mr. Balfour Browne's argument on behalf of the London County Council against the Bill. He contended that its only justification was necessity, and that this did not now exist. He acknowledged that the Company had been in difficulties; but he was not candid enough to admit that these had been created by the obstruction of the very body he represented. He attributed them to "want of forethought," which he said "the London "County Council, more than any other body, deprecated." But those who have followed the progress of water supply in the Metropolis during the past few years will know how far his remarks were justified. As to the money powers of the Bill, he urged that they should not be granted pending the settlement of the Metropolitan Water Question. He contended that the Company's proposals were extravagant, and would enhance the value of their undertaking against any possible purchaser; and therefore he asked the Committee not to pass the Bill. Sir Alexander Binnie repeated his previous objections to the scheme. Mr. G. F. Deacon expressed the opinion that the Company's existing reservoirs, with those authorized, would utilize the flow of the Lea as far as it was possible to do so; and the Chairman of the Water Committee of the London County Council (Mr. W. H. Dickinson) urged that, so far as the temporary supply proposed in the Bill was concerned, the Government measure provided all that was necessary. Mr. Baggallay, in reply, maintained that the scheme in no way prejudiced the consideration of the matters referred to Lord Llandaff's Commission; but his arguments were fruitless, for, as already stated, the Committee threw out the Bill. In view of this result, the Chairman of the Company (Colonel Lockwood, M.P.) has addressed to the Local Government Board and the Press the letter which will be found in another column. Of course, the Company do not for a moment question the decision of the Committee; but they are naturally desirous of putting on record now the facts they set forth, so that in the event of any difficulty arising hereafter, the responsibility may not rest with the Company, who have, by the rejection of their Bill, been prevented from proceeding with a scheme which, in their opinion, would ensure a constant supply of water in their district, and which they are advised is necessary, and could have been carried out without causing injury to any body or interest.

We have just been dealing with a case of the rejection by the Upper House of a Bill passed by the one below. It is curious to note that last week the reverse of this was witnessed in connection with another Water Bill. An enlargement of the boundary of the borough of Southampton has brought into the area under the jurisdiction of the Corporation certain districts supplied with water by the South Hants Water Company. As the Corporation possess an ample and excellent supply of water, they were desirous of having the whole service in their hands; and they applied to Parliament for power to acquire the portion of the Company's undertaking lying within the borough, on giving six months' notice. They hoped, by so doing, to adjust certain inequalities of water-rates now existing. At the same time the Company were seeking to extend their area, and raise further capital to the amount of £250,000. The Bills passed successfully through the House of Lords; and on reaching the Commons they were referred to a Committee presided over by Colonel Gunter. The Committee seem to have had doubts as to the advisability of sanctioning the Corporation's proposed purchase; and near the close of the inquiry the Chairman asked Sir Frederick Bramwell, who was giving evidence for the opponents, whether they would not be creating a precedent by so doing. His affirmative reply settled the fate of the Bill. He said he knew of no precedent where a portion of an undertaking had been forced out of the unwilling hands of a Company; and in the particular case under consideration he thought it was not in the interests of the water consumers in the added areas, nor, he believed, in the borough itself, that the Bill should pass. Sir Frederick took the opportunity of expressing his objection to municipal trading; but we need not speculate as to whether or not this had any influence upon the Committee. At all events, they declined to take the responsibility of creating a precedent, and rejected the Bill; subsequently passing that of the Company, which was unopposed. This is the second time the Corporation have failed in their attempt to get possession of the Company's undertaking. They first went for the whole of it, and were unsuccessful; now that they have only asked for a portion they have come off no better. The ratepayers will consequently have to pay a heavy bill of costs, without the consolation of having something to show for their outlay.

Energy Expended in the Various Systems of Lighting.— The watt, taken as a unit of energy in the production of various illuminations, has already given rise to several estimates. According to an electrical engineer, the expenditure of energy, expressed in watts, to produce, with the various systems, an illuminating power equal to the English standard candle is as follows: Tallow, 124; wax, 94; spermaceti, 86; mineral oils, 80; vegetable oils, 57; ordinary coal gas, 68; cannel coal gas, 48; electric incandescent lamp, 3·5; the Nernst lamp, 1·5; incandescent mantles, 1·02; electric arc, 0·03.

Society of Arts.—The annual meeting of the Society was held last Wednesday, when the Secretary (Sir H. Trueman Wood) read the report of the Council recording the proceedings during the year. His Royal Highness the Prince of Wales was re-elected President; and among the new members of the Council are Professor Dewar, F.R.S., and Sir W. H. Preece, K.C.B. We have already noticed the awards of the Society's medals for papers read during the past session; and it only remains to express gratification that the Albert Medal has been bestowed on Sir William Crookes, for his chemical and physical researches and their practical outcome.

Municipal Trading.—At a meeting of members opposed to the extension of municipal trading, held in one of the Committee-rooms of the House of Commons on Monday last week—Sir John Lubbock presiding—a resolution was adopted expressing regret that the Government have, up to the present, found themselves unable to appoint the Joint Committee on Municipal Trading which was promised at the commencement of the session, and concurrence with the resolution of the Society of Arts and the London and other Chambers of Commerce—"That it is inconsistent with such promise to confer further powers for trading purposes on Municipalities until such Committee has investigated the subject and reported thereon." The following were appointed an Executive Committee to watch future developments, and initiate such action as may be deemed necessary: Sir John Lubbock (Chairman), Mr. C. M'Arthur, Mr. Whitmore, Mr. W. F. Lawrence, Mr. Boulnois, Mr. Bonsor, Mr. Jackson, Mr. Kimber, and Mr. Cohen. The last-named gentleman will be the Honorary Secretary of the Committee. A copy of the resolution above referred to was forwarded to Mr. Balfour. In the House of Commons last Friday, Mr. Kimber elicited from Mr. Balfour the confession that he could not see how time was to be found for any useful investigation of the subject in the present session.

THE INCORPORATED GAS INSTITUTE.

PROCEEDINGS AT THE THIRTY-SIXTH ANNUAL GENERAL MEETING,

HELD AT

THE WESTMINSTER TOWN HALL, JUNE 13, 14, AND 15, 1899.

Mr. SAMUEL STEWART, of Greenock, President.

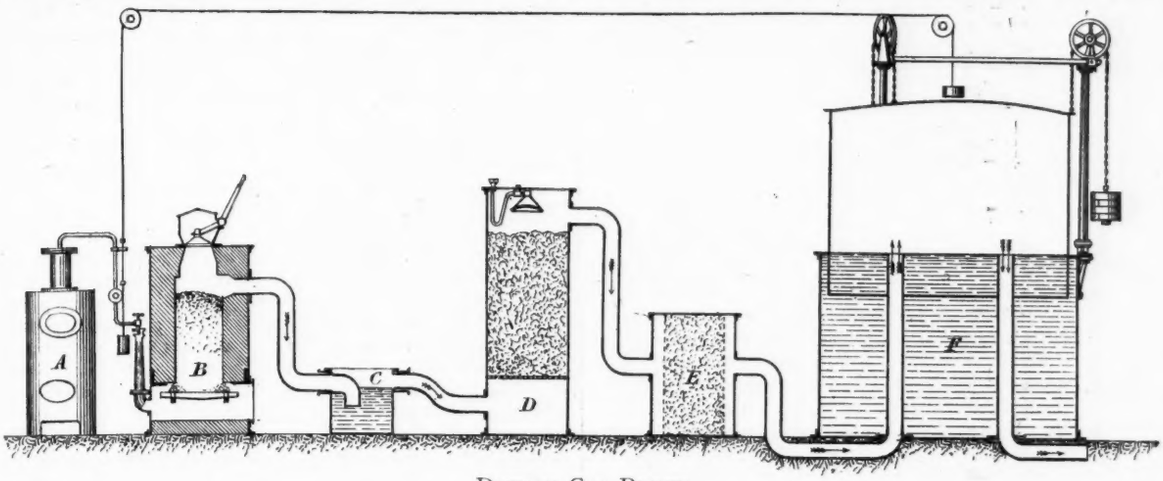
PAPERS AND DISCUSSIONS.

GAS FOR MOTOR PURPOSES.

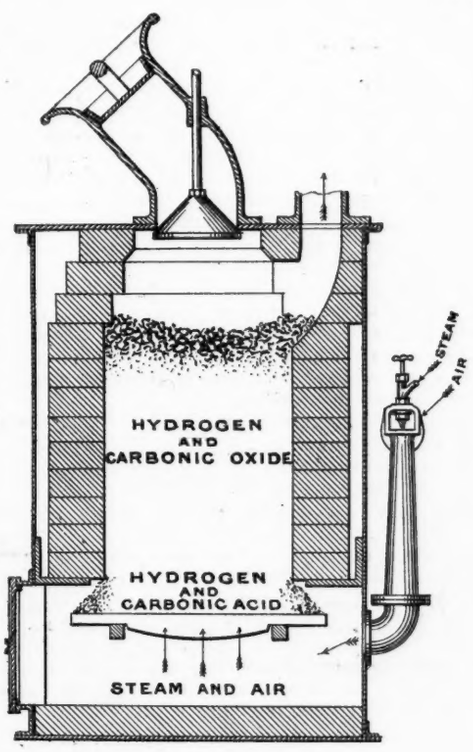
By T. ORMISTON PATERSON, of Birkenhead.

The subject of gas for motor purposes is one that has been treated from time to time by engineers both in this country and on the Continent; and it is one in which we, as gas engineers, naturally feel a deep interest. As gas manufacturers, we are as directly interested in the supply of gas for motive power as we are in its use for illuminating purposes. I think it is a universal fact that gas undertakings have been successful in increasing the consumption of gas year after year, notwithstanding the growth of the electric light industry. But we have, in addition to light, a great future before us in the supply of power to the electrician for producing electrical energy, not only for lighting, but, I believe, to a much greater degree for traction purposes; and it is particularly with reference to that view of the subject that this paper is written. The steam-engine has long held complete sway in all the industries of the world for providing power. The experience of recent years, however, shows that steam power must yield an important share to the gas-engine, as very large units of power are now available from this source, some examples of which will be cited presently. Various gases are available for energy in gas-engines, and are applied as circumstances admit. Enumerating some of the gases, we have coal gas, Dowson gas, Mond gas, producer gas, blast-furnace gas, coke-oven gas, and water gas. These cover generally the gases which are now in use for power purposes.

Dowson Gas.—Mr. J. Emerson Dowson (a name known to all gas engineers) has done excellent work in promoting the use of cheap gas for power, and by that means has created a demand for gas-engines where, in some instances, coal gas was not available, or, if available, at a price that was prohibitive in comparison to Dowson gas. Diagrams of the plant, kindly lent by Mr. Dowson, are shown, the description of which may be briefly given: A, the boiler for generating steam; B, the generator, charged with anthracite coal or coke; C, the hydraulic seal; D, the coke scrubber; E, sawdust scrubber; F, gasholder, and G, governing gear to stop the make of gas when the holder is full. Mr. Dowson, in a recent paper read before the Cleveland Institution of Engineers, gives the composition of his gas as follows:—



DOWSON GAS PLANT.



Carbon dioxide (CO_2) . .	6·3 per cent. by volume
Carbon monoxide (CO) . .	23·8 ,, ,,
Marsh gas (CH_4)	1·3 ,, ,,
Hydrogen (H_2)	19·8 ,, ,,
Nitrogen (N_2)	48·8 ,, ,,
	100·0

From the above analysis, it will be seen that the combustible gases amount to 44·9 per cent. From the same source I quote the units of heat obtained in the working of a 40-brake horse power engine.

In British thermal units (B.T.U.) the results are as follows: One pound of anthracite gasified in generator and 0·18 lb. coke in boiler, yielded 80·9 cubic feet of gas (at 32° Fahr. and 29·9″ of mercury pressure), having a calorific power of 164 B.T.U. per cubic foot. The balance-sheet of heat units is as follows:

Fuel Used.	British Thermal Units.		
1 lb. anthracite . .	= 14,760	= 80·9 cubic feet of gas, at 164 units per cubic foot	= 13,270 units.
0·18 lb. of coke in boiler at 12,960 units per pound .	= 2,330	Heat lost in process. . . .	= 3,820 ,,
Total heat in fuel .	17,090		17,090 units.

Efficiency of gas plant 77·6 per cent.

Including fuel, wages, and repairs, Mr. Dowson puts the cost of his gas at from 2d. to 3d. per 1000 cubic feet in the holder. In very large installations, I understand that the cost may not exceed 2d. per 1000 cubic feet. The efficiency as given above is exceedingly good; but I scarcely think

it is possible to maintain it. For instance, the calorific value of the gas is given at 164 B.T.U.—a very high figure for Dowson gas. In order to see whether there was much variation in the quality of gas made by this plant, I arranged for a series of calorific tests to be made at the works erected by Mr. Dowson for the Mersey Docks and Harbour Board, Coburg Dock, Liverpool. Nine results were determined by the Junkers calorimeter, when the plant had been working 10 hours after clinkering, giving an average net calorific power of 149·2 B.T.U. per cubic foot. Seven results were obtained when the plant had worked continuously up to 26 hours after clinkering, giving an average net calorific power of 139·1 B.T.U.

The above tests were made during the whole time between two coalings, which averaged about 20 minutes; 40 lbs. of anthracite being used for each charge. Three tests were made from the holder containing gas made from the 26th to the 28th hours after clinkering, giving an average net calorific power of 141·3 B.T.U. per cubic foot.

A test on a generator after working 48 hours, and just before clinkering, gave a net calorific power of 113·6 B.T.U. per cubic foot. The generators are only clinkered every 48 hours. As the two series of tests given above, also the one from the holder, were obtained within the first 28 hours after clinkering, the results must be considered better than the average performance over the whole 48 hours. The average of these gives 143·2 B.T.U. per cubic foot. The tests were made on a plant supplying 200-horse power during the day, and 80 to 90 horse power during the night. For the purpose of comparison, I take the figures given by Mr. Dowson on a 250-horse power plant, and apply the heat units obtained at Liverpool.

Balance-Sheet of Heat-Units.

Fuel Used.	British Thermal Units.			
1 lb. anthracite . .	= 14,760	=	78·3 cubic feet of gas, at 143·2 units per cubic foot	= 11,200 units.
0·14 lb. of coke in boiler, at 12,960 units per pound .	= 1,810		Heat lost in process	= 5,370 ,,
Total heat in fuel	16,570			16,570 units.

Efficiency of gas plant, 67·6 per cent.

Mr. Dowson, taking the calorific value at 175 units per cubic foot, obtains an efficiency of 82·7 per cent.

While on the subject of Dowson gas, it may be of interest to give some particulars regarding plants working at Zürich and Lausanne, Switzerland, which towns I visited last year. In these places there is an extensive system of electric tramways; the dynamos producing the current being driven by gas-engines supplied with low-grade gas. At Zürich, the generating plant is on the Hirzel system, which is practically the same as the Dowson process. There are two sets of producers each capable of yielding 10,600 cubic feet of gas per hour. The fuel used is Belgian anthracite, costing 25s. per ton at the engine-house. In a report prepared by Herr Meyer, of Zürich, on the working of the above plant, and of the gas-engines of 50-horse power manufactured by Crossley Bros., the following interesting particulars are given: A large number of calorific tests were taken during a trial period extending over three days. Herr Meyer obtained an average net value of 140·9 B.T.U. per cubic foot on the third day's working. He also found that the calorific value of the gas varied hourly to the extent of about 10 to 15 per cent.; also that the values increased continuously up to the middle of the day, the maximum for the afternoon being 32·3 per cent. higher than the minimum in the morning. Herr Meyer attributes the hourly fluctuations to the distillation of the charge in the producer, and not to variations in depth of fuel, or to variations of boiler pressure.

There is an important relation shown in these experiments between the calorific value of the gas and the explosive pressure in the cylinder of the gas-engine. It appears, according to Herr Meyer, that the pressure largely increases as the calorific value of the gas rises; for an increase of calorific value of 30·8 per cent., the mean increase of pressure was 61·5 per cent. On the second day of the experiments, Herr Meyer states that the engine was working under a full load, with the result that the mean indicated pressure on the day's working was 59·5 lbs., with a minimum of 48 lbs. The brake horse power on the maximum explosive pressure—73 lbs.—amounted to 66·8 brake horse power; the minimum—48 lbs.—gave 42·4 brake horse power. The average brake horse power for the day was 56·8. In connection with these figures, the fuel consumption in the producer is given as 1·23 lbs.; boiler consumption, 0·16 lb.—making a total of 1·39 lbs. per brake horse power per hour. The consumption of gas per brake horse power per hour varied from 89·5 to 93·1 cubic feet.

The plant at Lausanne supplies the power for a complete system of electric tramways. It is by Fichet and Heurtey, on the Taylor system. The design and principle of working is much the same as the plant at Zürich. Both the steam and air are superheated in passing up a vertical chamber where the gases from the producer are flowing in an opposite direction. The plant has now been in work about two years, and supplies gas-engines indicating 400-horse power. The fuel used amounts to 1·25 lbs. anthracite per brake horse power per hour. During a period of 18 months the electric tram system was worked without the least interruption; although there was no reserve engine or producer to fall back upon in case of accident.

The composition of the gas is—

	Per Cent.		
H_2	20·6	combustible gases	42·9
CO	20·2		
CH_4	2·1		
CO_2	6·6	non-combustible gases	57·1
O_2	0·1		
N_2	50·4		
	100·0		

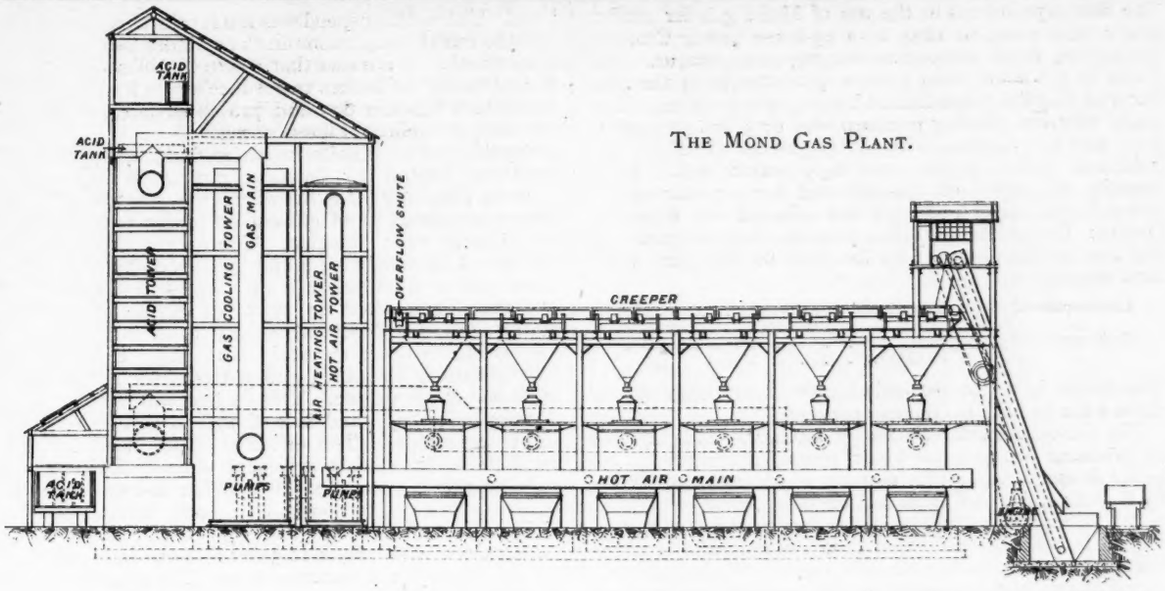
The gross calorific value is 150·1 B T.U. per cubic foot at 32° Fahr. and 30 inches pressure. There are in Lausanne some very heavy gradients, the steepest being 1 in 8; and in that case the electrical energy is raised to 60-horse power on the axles. The speed of the cars is maintained at 8 miles per hour on the heaviest gradients.

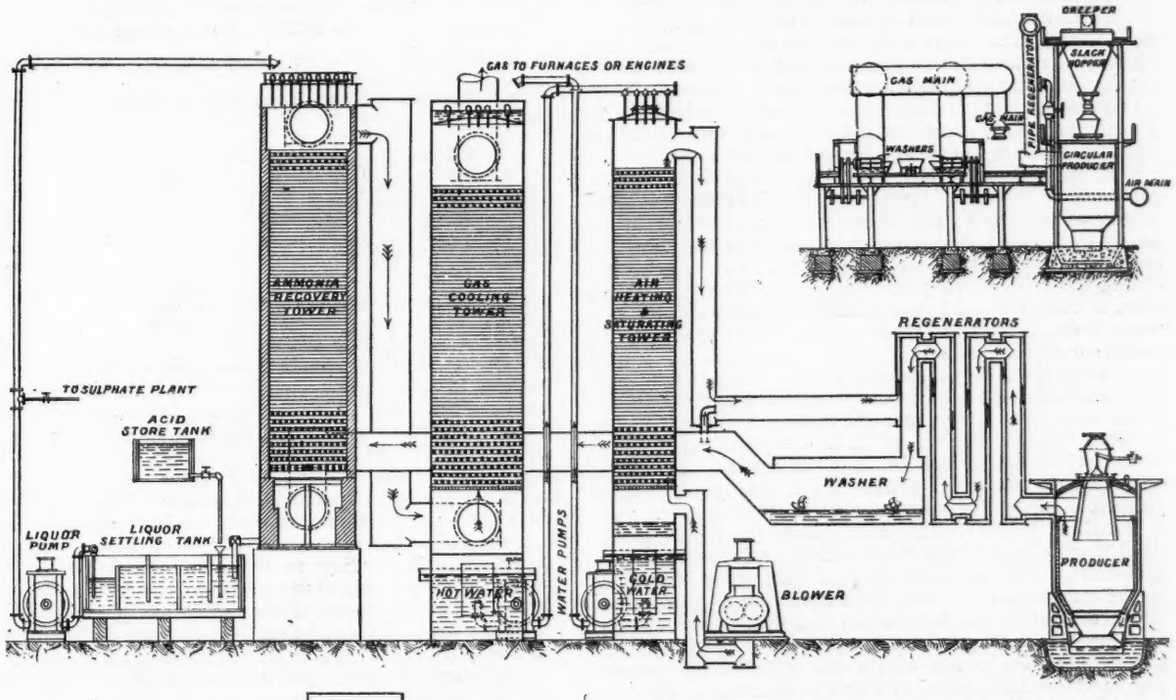
Mond Gas.—Dr. Mond has perfected a very beautiful process whereby large volumes of power gas are obtained, and at the same time all the ammonia is recovered. Mr. Herbert Alfred Humphrey deals fully with this process in a paper read at a meeting of the Institution of Civil Engineers. Mr. Humphrey has kindly lent the diagrams used on that occasion, which plainly show the arrangement of the plant. The following are some of the main points extracted from the paper referred to: A producer containing bituminous slack is charged automatically at intervals with 8 to 10 cwt. For a time the freshly-introduced slack is confined in the bell-shaped casting, where it undergoes a process of distillation. As the products formed have to pass downwards through the hot zone before they can escape, the tar is destroyed and converted into fixed gas; so that the fuel has parted with all its tar before it arrives in the main body of the producer. The mixture of steam and air passes down between the inner and outer shells of the producer, and is thereby heated, and the inner shell cooled.

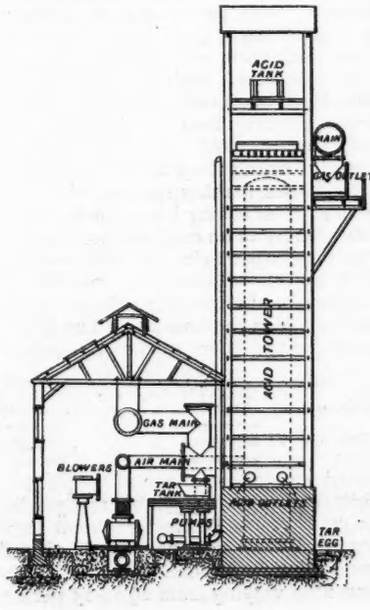
The mixture enters the producer at 250° C. Owing to the low temperature of the producer, resulting from the large quantity of superheated steam introduced with the air, the ammonia is not decomposed, the fuel does not cake, and no clinker is formed. The gas produced, at a temperature of 450° C., passes to the regenerator, a system of vertical double tubes, where the air and steam mixture for the producer is heated. The gas passes next to a washer fitted with mechanical dashers, which fill the chamber with fine spray. Here nearly all the heat of the gas is taken up in the formation of steam or water vapour, at a temperature of about 90° C. This steam is not sufficient to saturate the gas; so that the liquor in the acid tower—through which the gas next passes—is not weakened by the deposition of condensed steam.

The acid liquor contains 4 per cent. free acid, maintained constant; the liquor containing sulphate being continually withdrawn. The gas leaves the acid tower at a temperature of 82° C., and flows to a gas-cooling tower. It passes in at the bottom, and as it ascends meets a downward current of cold water. This reduces the capacity of the gas for carrying steam, condensation taking place; consequently the circulating water takes up the latent heat of the steam condensed, as well as the sensible heat of the steam and gas. The gas then leaves the plant at a temperature of 66° C. for consumption. The hot water leaving the gas-cooling tower is pumped into the top of the air-heating tower, where its heat obtained from the gas as described is given to the cold air on its way to the producer. The air is thus saturated with water vapour; and by this

THE MOND GAS PLANT.







means alone 1 ton of steam is carried into the producer for each ton of fuel gasified. Throughout the process the gas is under pressure, furnished by the blower driving the air into the producer. For every ton of fuel fed into the producer, about 2½ tons of steam and 3 tons of air are blown in. Of the steam, 1 ton, as stated above, is furnished by the system of regeneration, and 1½ tons added by exhaust steam from various engines and pumps. Nearly 4½ tons of gas are obtained from 1 ton of coal; equal to about 160,000 cubic feet at ordinary atmospheric temperature. One ton of sulphate is obtained from 23 tons of fuel gasified in the producer; adding 5·56 tons for the extra steam required—a total of 28·56 tons produces 1 ton of sulphate.

With an average cost of coal of 6s. 2d. per ton, and sulphate selling at the works at £7 4s. 6d. per ton, the cost of gas works out to 4s. 11·1d. per ton of fuel gasified; 1000 cubic feet of gas at 15° C. costing 0·351d.

The composition of Mond gas is as follows:—

H_2	24·8 per cent.
CH_4	2·3 ,,
CO	13 2 ,,
CO_2	12·9 ,,
N_2	46·8 ,,
	100·0

Total combustible gases, 40·3.
Calorific value, 154·6 B.T.U. per cubic foot.

The first experiments in the use of Mond gas for motive power were made in 1894 on a 25-horse power Crossley gas-engine, fitted without scavenging arrangement. The result of a 2 hours' trial gave a consumption at the producer of 1·03 lbs. per indicated horse power per hour. The mean effective working pressure was 67·3 lbs. per square inch, and the consumption of dry gas at 32° Fahr. per indicated horse power was 69·7 cubic feet. More recently an engine of 150-indicated horse power of the two cylinder end-to-end type has afforded the following results: The average effective pressure from diagrams for the two cylinders was 82·1 lbs. and 80 lbs. per square inch respectively.

Consumption of coal at the producer per I.H.P. . . .	0·92 lb.
" " " " " " B.H.P. . . .	1·11 lb.
Consumption of gas per I.H.P.	65·7 cubic feet.
" " " B.H.P.	79·2 "

The brake horse power includes the power required to drive a fan to increase the gas pressure.

The Buire-Lencauchez System of Producer.—This system of producer varies from other plants, inasmuch as no boiler is used. A certain amount of steam is produced by radiation, by the introduction of a small stream of water falling on to hollow plates under the grate, and thence into the ashpit, where, on account of the fierce heat, it is rapidly converted into steam. The steam produced has no high pressure, but, by means of an air-blast, is sucked up and driven through the generator; a gas-engine being used to drive the fan for that purpose. Especially noticeable in this producer is a mid-feather dividing the charging opening from the take-off opening. Thus a certain amount of fresh coal immediately below the charging opening is not brought at once into chemical reaction, because the air and steam do not reach it but pass off at a lower level. In a trial of a 300-horse power gas-engine, "Simplex" type, at the Pantin Mills, France, it was found that with the above gas 320 indicated horse power was given; whereas with ordinary lighting gas the indicated horse power would rise to 450. The engine was, during the trial, driving the milling machinery; and, by care, a constant load was obtained corresponding to a mean indicated horse power of 280. This gives a consumption of fuel of 0·81 lb. per indicated horse power. In this system of generator, the quantity of gas produced per pound of coal varies from 64 cubic feet to a maximum of 80 cubic feet. The calorific power of the gas varies between 135 B.T.U. and 166 B.T.U. per cubic foot, whatever coal is used; and the best and most economical explosive mixture corresponds to a consumption of from 50 to 70 cubic feet of gas per indicated horse power.

Mr. C. F. Jenkin, in his paper before the Institution of Civil Engineers, in 1896, deals with the efficiencies of gas-producers. The efficiency of a producer may be defined as the ratio of the heat contained in the gas as it leaves the producer to that contained in the coal from which the gas is made. This question, which is of great theoretical importance, hardly comes within the scope of the present paper, which deals more with the production of gas of a suitable calorific value at a moderate cost.

Blast-Furnace Gas as a Motive Power.—In the October number of "Cassier's Magazine," 1898, an interesting account is given by Mr. H. Savage, Engineer of the Société John Cockerill, Seraing, Belgium, on the introduction and progress of blast-furnace gas for motive power in his works. Mr. Savage states that each ton of pig iron run from the hearth of a blast furnace is accompanied by the evolution, from the furnace top, of from 150,000 to 180,000 cubic feet of combustible gas; and that the combined gas-furnaces in his works are capable of affording 12,000 to 14,000 indicated horse power. From 2000 to 2500 horse power are required to drive the different blowing engines, hoists, pumps, and other machinery, thus leaving 10,000 to 12,000 horse power—a force sufficient to operate the different mills, forges, tools, and workshop appliances which complete the paraphernalia of a large modern iron-works. Encouraged by the results obtained with small engines, this Company resolved to put down a "Simplex" of large size; and subsequently a 200-horse power engine was designed by M. Delamarre. This engine has one working cylinder 31 inches diameter, with a stroke of 39·37 inches. Trials of the engine, conducted by M. Witz, show that, during a continuous run of 24 hours, an almost constant power of 180 indicated horse power was maintained on a gas consumption of 115 cubic feet per hour. The working speed was 100 revolutions per minute; and the initial compression in the cylinder was 115 lbs. per square inch. It appears that where the blast-furnace gas is used under the boilers to produce steam for the engines, somewhere between 600 and 700 cubic feet are required per hour per indicated horse power.

Speaking of large units in gas-engines, we appear to be somewhat behind our American cousins in this respect. It is to Pittsburg (U.S.A.) where we must look for the largest combinations of gas-engine power ever connected up directly to a dynamo. There, the Westinghouse Machine Company have found the necessity of providing great power from the use of natural gas, and to that end they constructed, in 1898, an engine of 650-horse power, of the three-cylinder vertical type, with a speed of 150 revolutions per minute. The same Company are now preparing drawings and patterns for a 1500-brake horse power gas-engine. This engine will also be of the three-cylinder type, and is designed to run at 100 revolutions per minute. The effective brake horse power at the shaft is expected to represent a heat efficiency of 30 per cent. at a consumption of $8\frac{1}{2}$ cubic feet of natural gas per horse power per hour. It appears that the average performance of a Westinghouse gas-engine, say from 20-horse power upwards, is 10·5 to 12 cubic feet of natural gas per brake horse power per hour. The average calorific tests with the Junkers calorimeter show the natural gas at Pittsburg to be 1000 B.T.U., giving a heat efficiency at the shaft $\frac{33{,}000 \times 60}{772 \times 10{,}500} = 25{\cdot}4$ and 21·3 per cent. respectively. The composition of the Pittsburg natural gas is as follows:—

Hydrogen (H)	22·0 per cent.
Marsh gas (CH_4)	67·0 "
Unsaturated hydrocarbons (C_nH_{2n}) .	6·0 "
Carbonic oxide (CO)	0·6 "
Nitrogen (N)	3·0 "
Carbonic acid (CO_2)	0·6 "
	100·0
Total combustible gases . .	95·6

I have received from Messrs. Crossley Bros., Limited, the following particulars of a gas-engine to be driven by Mond gas. It has two cylinders, each 26 inches diameter by 36 inches stroke. It is to run at 150 revolutions per minute. It has a maximum of 543 indicated horse power, 462 maximum brake horse power, and a safe working load of 372 brake horse power; thus being the largest gas-engine hitherto constructed by this firm. The engine is built on the ordinary lines of their tandem engines—that is to say, with the cylinders facing each other, and the connecting rods leading to the same crank-pin. The flywheel is on one side of the engine; the other end of the crank-shaft being coupled direct to a large dynamo.

Gas-Engines Supplied with Coal Gas.—Messrs. R. Dempster and Sons, of Elland, have kindly supplied me with particulars regarding the working of their gas-engines. There are three 14 nominal horse power engines, giving 23 brake horse power respectively. One engine drives the whole of the boiler shop machinery, which includes heavy punching and shearing machines, multiple punching machines, guillotine shears and plate rolls, bending and straightening machines, angle-iron ring bending machines, hoists, fans, driller, emery wheel, cold saw, and hydraulic pump. Another drives the fitting shop machinery, consisting of a large number of lathes, planing, shaping, slotting, screwing, and drilling machines, boring bar, grindstones, crane, and other usual machinery of an engineering shop. The other engine drives the carpenter's machinery—circular saws, lathes, boring machines, cramping machines, multiple saws; also an overhead crane, clay mill, sand mixer, hoists, and other machinery in the foundry. The following is the consumption of gas and hours worked by each engine:—

Boiler shop engine .	3,493,000	cubic feet. . .	10,279¾ hours.
Fitting shop do. .	3,030,300	" " . .	11,164¾ "
Carpenter's shop do. .	4,054,600	" " . .	13,062¼ "
Totals . .	10,577,900	" " . .	34,506¾ "

These figures give an average rate of 306½ cubic feet of gas per hour, which represents 13·3 cubic feet per brake horse power per hour. Messrs. Dempster do not state the price they pay for gas; but on referring to the Board of Trade returns, I find the price at Elland is 2s. 6d. per 1000 cubic feet, with discounts varying from 2½ to 15 per cent., and it

is fair to assume that the firm will be placed on the higher scale of discount, making their price 2s. 1½d. per 1000 cubic feet. If this is so, the cost for gas per brake horse power per hour comes out at 0·339d.; and to compare it with steam, a figure of 10,500 cubic feet per 2240 lbs. of coal may be taken, thus giving 2·84 lbs. of coal per brake horse power per hour, which, I think, is better than steam in ordinary day in and day out working. As before stated, these engines work on 13·3 cubic feet per hour with gas at an assumed calorific power of 650 B.T.U. That is, the engines require 8645 B.T.U. for each brake horse power per hour, giving a heat efficiency at the shaft—

$$\frac{33{,}000 \times 60}{772 \times 8645} = 29{\cdot}6 \text{ per cent.}$$

These results, being taken on a large practical and reliable scale, give excellent testimony to the use of gas for motive purposes. About 18 months ago, I arranged for a series of tests to be made on a small gas-engine at the Birkenhead Gas-Works, which drives the machinery in fitting shop, smiths' shop, and joiners' shop. The tests were made on (1) town gas, composed of half coal and cannel gas and half carburetted water gas, each of an illuminating power of 21 candles; (2) pure carburetted water gas, 21 candles illuminating power; and (3) straight water gas. I should say that the engine from which the data were obtained is one of Messrs. Crossley's old type; therefore the results are poor in comparison with what could be obtained from the engines they now make. Alongside the figures actually obtained, I place figures which Crossley Bros. are prepared to guarantee on an engine giving off a safe working load of 300-brake horse power.

The results of the tests are as follows:—

			Messrs. Crossley's Figures.
Town gas . 10·6 B.H.P. Consumption of gas per B.H.P. per hour.	24·9 Cub. Ft. ..		17·2 Cub. Ft.
Carburetted water gas . 11·16 B.H.P. Consumption of gas per B.H.P. per hour	27·6	,, ..	19·0 ,,
Straight water gas . 10·24 B.H.P. Consumption of gas per B.H.P. per hour	44·1	,, ..	30 5 ,,

From the above, it will be seen there is little difference between town gas and carburetted water gas. There is, however, a difference of 77 per cent. between town gas and straight water gas.

There is no doubt that great improvements have been achieved in the efficiency of gas-engines since these experiments were conducted in Birkenhead. The scavenging of the cylinders to clear out the residue of the explosions has added greatly to the efficiency, due, of course, to the capacity of the cylinders being freed from non-combustible gases. It is also necessary to state that the engine on which these tests were taken is very small—10 brake horse power; therefore the cooling surfaces in the cylinder are very much larger than in engines of greater size, where large volumes of gas are exploded with a minimum cooling surface exposed to the gas.

The following figures give the thermal value of the gases and their efficiency at the engine shaft, or, in other words, work done:—

B.T.U. per Cubic Foot.			
618·7	*Town gas*	gives a heat efficiency of	16·7 per cent.
568·3	*Carburetted water gas* .	,, ,,	16·3 ,, ,,
276·4	*Straight water gas* . .	,, ,,	21·4 ,, ,,

At Messrs. Crossley's consumption of gas, the heat efficiencies are:—

Town gas	24·1 per cent.
Carburetted water gas	23·8 ,,
Straight water gas	30·4 ,,

Straight water gas has not yet taken up that position with us which its superior character for motive purposes warrants. This state of things is mainly due to the fact that water gas was introduced into this country more for the purpose of supplying towns with illuminating gas rather than for power purposes. Water gas is, however, superior to all the other non-illuminating gases, and there appears no doubt of its future being a bright one, because corporations and gas companies can, for example, provide cheaply the power required to generate electricity for tramways—a system of traction which is now becoming common to all towns of importance. Of course, there is a much wider field open for the use of this cheap and valuable gas; but where any town or authority is about to embark in work of the kind mentioned, then the cheapest fuel available is straight water gas. Its introduction for the purposes named would open up a new era in gas undertakings, as its further extension would inevitably be assured. Moreover, the gas-engine is not now limited to small power; and it successfully competes with the very best type of steam boiler and engine.

Where surplus carburetted water-gas plant exists, connections may be arranged to enable their use being applied for the manufacture of either straight water gas or illuminating gas at will. The action in the working of an ordinary carburetted water-gas plant is different to that of a water-gas plant. In the former case, carbon monoxide is purposely blown from the coke generator into the carburetter and superheater, where a second air-blast meets the gas to bring about combustion, thereby heating up these vessels to the temperature required to gasify and fix in a permanent way the oil gas there made for the enrichment of the water gas. In order to accomplish this, a considerable expenditure of fuel is required to produce the necessary carbon monoxide. In the case of straight water-gas plant, no heat is required for the heating of the secondary chambers, therefore all the heat should be retained in the generator; and Carl Dellwik has successfully accomplished this in his plant. In a lecture delivered by Professor Lewes at a meeting of the Society of Arts, he gave some of the results he obtained from the Dellwik plant at Warstein, Westphalia. Being present on the occasion when these tests were made, I had an opportunity of observing the various results that were obtained throughout the day.

The results given by Professor Lewes, and his observations generally on the plant, are of such importance that I venture to put some of them before you. He says:—

> In all the attempts to make water gas which had seen the light up to last year [1897] the raising of the fuel to incandescence has practically always been obtained by using the air-blast in so deep a bed of fuel that the carbon monoxide and residual nitrogen of the air formed the chief resultant products; and it must be remembered that when 1 lb. of carbon combines with oxygen to form carbon monoxide, as when forming producer gas, only 2400 heat-units are developed, whilst if air be present in sufficient quantity to burn the carbon direct to carbon dioxide, the amount of heat which is evolved is 3·37 times as great—that is, 1 lb. of carbon gives 8080 heat units. A process for making water gas has been devised by Carl Dellwik, in which this fact is utilized by the adjustment of the air supply, and by keeping the level of the incandescent fuel in the generator at a constant height. Under these conditions, the producer gas ceases to exist as a bye-product; and the products of the blow consist merely of the ordinary non-combustible products of complete combustion—carbon dioxide and nitrogen—the result being that double the quantity of water gas can be made per pound of fuel than was before possible, and the extra heat generated minimizes the period of blowing, and enables runs or times of steaming to be continued for longer than has been possible before. . . . The period of blowing rarely exceeds two minutes, and it is possible to steam for from seven to ten, according to the condition of the fuel. The first product of the decomposition of the steam by the carbon is in every case carbon monoxide and hydrogen. But if the fuel is so far cooled as only to admit of the decomposition of a portion of the steam, the excess of steam oxidizes the carbon monoxide into carbon dioxide; and the secret of the low carbon dioxide in the gas made by the Dellwik process, in spite of the long period of steaming, is that, instead of allowing the steam to blow into the incandescent fuel in large volumes, its flow is so regulated that even at the extreme end of the run, there shall be no excess of steam to oxidize the carbon monoxide to dioxide.

This extract, I think, clearly shows the action of the plant. The following figures show the products of combustion given off during a blow:—

	I.		II.
Carbon dioxide	17·9	..	18·8
Carbon monoxide	1·8	..	1·0
Nitrogen	78·6	..	79·5
Oxygen.	1·7	..	0·7
	100·0	..	100·0

Professor Lewes, in another portion of the same lecture, says:—

> The introduction of this new process would put an entirely new complexion upon the value of water gas for fuel purposes, as only one-half the weight of carbon previously employed for making the gas is now used; and instead of having only some 40 per cent. of the heat energy present in the original carbon transferred to the gas, now something like 82 per cent. of the heat value of the coke used in both generator and steam boiler is available in the gaseous condition. In other words, it is now possible to make, in the Dellwik plant, 70,000 cubic feet of water gas from a ton of good coke; while 34,400 tons was the average make by previous alternating processes.

The coke used in these tests was obtained from Krupp's works, being ordinary gas-works coke. Twenty-five pounds were used in the generator and 5 lbs. in the boiler per 1000 cubic feet of gas made. The efficiency of the plant, taking

for the calorific value of the gas the figure I obtained from my tests at Birkenhead on water gas, is as follows :—

	B.T.U.		B.T. U.
1 lb. coke in generator	12,960	40 c. ft. of gas at 276·4 net units per c. ft. . . .	11,056
·2 lb. coke in boiler at 12,960 units per lb.	2,592	Heat lost in process	4,496
Total heat in fuel	15,552		15,552

Efficiency of plant $\frac{11,056}{15,552} = 71{\cdot}1$ per cent.

With regard to the production of water gas by Dellwik's process on the large scale, the following particulars taken from a paper read by Herr Dicke at a meeting of the Association of Gas, Electrical, and Water Engineers of Westphalia, are of interest: At Königsberg, Germany, water gas enriched with benzol is used to supplement the supply of ordinary coal gas for illuminating purposes. The water gas is produced in Dellwik generators, furnished by the Warstein Foundry. The consumption of coke per 1000 cubic feet of gas is 27·4 lbs. in the generator, at a cost for coke of 1·53d. Herr Dicke gives the cost of producing 141,250,000 cubic feet of gas as being at the rate of 3·71d. per 1000 cubic feet. This figure includes coke at 10s. 5d. per ton, steam, water, wages, oil and waste, purifying material, wear and tear, and interest on cost of generator, scrubber, blower, steam-engine, mains, station meter, gasholder, buildings, and also a benzol carburator.

With regard to the cost and application of this gas for tramway purposes I give the following figures and results, which are part of a joint report by the Electrical Engineer of Birkenhead and myself.

Net Cost of Producing Water Gas and Delivering it at the Electric Station.

Gas makers	0·150d.
Boiler men	0·160
Labourers	0·110
Purifying labour and materials . . .	0·233
Wear and tear	0·260
Coke for generator and boilers (30 lbs.) at 9s. per ton	1·446
Interest and sinking fund on a capital of £5000, at 5 per cent.	0·641
	3·000d. per 1000 cubic feet.

Taking the Electrical Engineer's figures of an average load of 525-horse power for 16 hours per day, and using 30·5 cubic feet of water gas per effective horse power per hour on 365 days, the annual consumption of gas amounts to 93,513,000 cubic feet; and the annual cost is as follows :—

$$\frac{525 \times 16 \times 365 \times 30{\cdot}5}{1000} \times 3\text{d. per } 1000 = £1170,$$

which represents the amount of gas fuel required.

Cost by Steam Power.

	£	s.	d.
Cost of coal $\frac{3{\cdot}39 \times 525 \times 16 \times 365}{2240} \times$ 7s. 6d. per ton	1740	0	0
Cost of stokers	260	0	0
	£2000	0	0

From the foregoing, it will be seen that the difference between the net cost of gas and the net cost of coal is £830, or 41 per cent. in favour of water gas.

Taking the generator and boiler of the water-gas plant at a consumption of 30 lbs. per 1000 cubic feet, this gives a consumption equal to 0·9 lb. per effective horse power.

The composition of straight water gas at Birkenhead is as follows :—

Hydrogen (H_2)	51·6 per cent.
Carbon monoxide (CO)	43·4 ,,
Carbon dioxide (CO_2)	3·7 ,,
Residue	1·3 ,,
	100·0

Total combustible gases, 95 per cent.

Gas Trams at Blackpool.—It was my wish to have given some practical details of the cost and working of this line; but not having obtained the necessary information, I am unable to do so.

Belfast Electric Light Installation.—As members of this Institute visited Belfast very recently, it is only necessary to mention the installation. The gas-engines are supplied with coal gas from the Corporation gas-works. Judging from figures by Mr. Victor A. H. M'Cowen, Electrical Engineer, it appears that the gas consumption is considerably heavier than the consumption now obtained in the best modern engine. By the introduction of straight water gas on the present installation, the cost of production would be considerably reduced.

I have endeavoured in this paper to bring before you some examples of the various methods of obtaining gas for motor purposes; and also to show the relative efficiencies of the plants in question, and the value of the gas produced. The data relating to water gas clearly show its superiority to all other ordinarily available examples of gaseous fuel. The cost of production compares favourably with that of Dowson gas, when the great difference in the calorific value of the respective gases is taken into account; being nearly in the ratio of two to one in favour of water gas. The experiments at Zürich, besides our own experience, show how largely the calorific value of the gas enters into the question of the economical use of gaseous fuel. On the question of the heat efficiency of a water-gas plant, the figure I arrived at for the plant at Warstein, 71·1 per cent. on average working, does not compare unfavourably with the 82·7 per cent. given by Mr. Dowson, which, he expressly states, represents the highest results obtainable with his plant, when working with all possible care.

The tendency nowadays is towards the production of energy, especially electrical energy, on as large a scale as possible, at a central generating station for subsequent distribution. It behoves us, therefore, as gas engineers, to realize that we have in our hands the means of supplying the best and cheapest fuel—gaseous fuel—for this purpose, and also to see that this power does not pass from us.

All my data have been obtained from original sources, some of which, however, have already appeared in the "JOURNAL OF GAS LIGHTING;" and I am indebted to my nephew, James Paterson, B.A. Camb., of Cheltenham, for translations where necessary.

APPENDIX I.—*Tests on Dowson Gas at the Mersey Dock and Harbour Board's Engineering Works, Coburg Dock, Liverpool.*

Plant of two producers supplying 200 h.p. Producers charged about every 20 minutes with 40 lbs. of anthracite, clinkered every 48 hours. Steam pressure 50 lbs.

Date.	Description.	Age of Fire after Clinkering.	Calorific Value. Gross.	Average Gross.	Average Net.
1899.		Hours.	B.T.U. per C. Ft.	B.T.U. per C. Ft.	B.T.U. per C. Ft.
May 26.	Series of tests made between two successive coalings . .	10	144·6 163·6 167·2 *161·9 163·9 170·8 160·8 154·9 145·8	159·3	149·2
May 27.	Series of tests made between two successive coalings . .	26	144·8 167·1 159·5 150·8 145·1 139·7 137 1	149·2	139·1
May 27.	Tests made on gas from holder after plant was stopped . .	26 to 28	151·3 150·8 152·1	151·4	141·3
May 26.	Test just before clinkering .	48	123·7	123·7	113·6

* Plant not working while this test was made.

TABLE IA.—*Analysis of Dowson Gas at Liverpool, May 26-27, 1899.*

	I.	II.	Average.
Hydrogen (H_2) . . .	19·8	18·9	19·3
Carbonic oxide (CO) .	24·5	24·8	24·6
Carbon dioxide (CO_2) .	6·1	6·3	6·2

NOTE.—Methane (CH_4) was not determined.
Gross calorific value calculated on the above average analysis = 150·8 B.T.U. per c. ft.

Discussion.

Mr. CARL DELLWIK, being invited to speak by the President, said that after Mr. Paterson's exhaustive paper, there was very little to add; but he should like to point out some of the advantages of water gas. Dowson gas, or any kind of producer gas, contained a great volume of non-combustible gas; and, therefore, to obtain a certain efficiency, the engine employed must be considerably larger than where coal gas was used. This was not the case with water gas, which was all combustible. An engine for use with pure water gas gave about the same efficiency for the same size as an engine used with coal gas. On the point of efficiency,

APPENDIX II.

Calorific Tests made at Birkenhead Gas-Works with Junkers Calorimeter.

Date.	Description.	Number of Tests.	Calorific Value.		Percentage in Town Gas.		Oil Used for Carburetted Water Gas.	Percentage of Cannel Carbonized.	Average Illuminating Power.
			Gross.	Net.	Carburetted Water Gas.	Coal and Cannel Gas.			
			B.T.U. per C. Ft.	B.T.U. per C. Ft.	Per Cent.	Per Cent.	Galls. per 1000 C. Ft.	Per Cent.	Candles.
Dec. 19, 1898	Town gas	20	684·0	609·7	26·8	73·2	2·91	22·4	..
Jan. 25, 1899	,,	9	693·4	622·9	28·4	71·6	2·96	27·6	..
Feb. 8, ,,	,,	4	701·8	633·3	30·7	69·3	2·72	27·0	..
March 10 ,,	,,	6	711·1	642·1	24·7	75·3	2·96	25·8	..
	Average of all tests on town gas		697·6	627·0	27·6	72·4	2·88	25·7	22·22
Dec. 21, 1898	Coal and cannel gas	9	721·4	645·3	..	..	..	22·4	..
Jan. 20, 1899	,, ,,	5	762·8	688·2	..	..	..	28·0	..
Jan. 23, 1899	,, ,,	10	749·3	673·8	..	..	..	27·6	..
	Average of all tests on coal and cannel gas		744·5	669·1	..	..	..	26·0	..
Mar. 3, 1897*	Coal and cannel gas	..	764·0	676·4	..	..	..	35·8	22·30
Dec 20, 1898	Carburetted water gas	9	602·8	554·5	..	..	2·85	..	..
Dec. 21, ,,	,, ,,	9	606·8	555·7	..	..	2·8)	..	..
Jan. 25, 1899	,, ,,	15	625·2	574·9	..	..	2·95	..	..
March 10 ,,	,, ,,	11	639·8	588·0	..	..	2·96	..	..
	Average of all tests on carburetted water gas		618·6	568·3	..	..	2·97	..	21·73
Mar. 3, 1897*	Carburetted water gas	..	677·1	641·1	..	..	3·95	..	22·70
Dec. 11, 1898	Uncarburetted water gas	14	290·6	262·3	..	..	..	..	..
May 10, 1899	,, ,,	18	302·5	276·4	..	..	..	..	..

* Test made by Professor V. B. Lewes.

it would be noticed that the figure given by Mr. Paterson (obtained from Messrs. Crossley's factories) was an efficiency for water gas of 30 per cent. of the heating value of the gas. Now in water gas it was possible to realize 70 per cent. or more—they had run up to considerably over 75 per cent.—of the value of the solid fuel. Therefore, it was possible to realize in power, more than 21 per cent. of the heating value of the solid fuel. When it was remembered that the best make of large steam-engines only realized from about 9 to 12 per cent., it showed that it was possible, by the use of gas, to obtain a much higher efficiency—in fact, he believed it was the highest at present obtainable in the shape of power. Mr. Paterson, he believed, had rightly pointed out that the time was near at hand when gas-works would be able to supply power for tramways and other purposes, and at a cost with which no other source of power could possibly compete.

Mr. T. N. Ritson (Kendal) said that a few months ago it was his duty to report to his Committee on the question of an electric-lighting scheme; and as the carbonizing part of their gas-works was getting rather deficient, he gave careful consideration to the question of recommending carburetted water gas to be adopted both for gas-works purposes and for driving gas-engines for the electric lighting plant. He believed more consideration would have been given to the scheme by his Committee had it not been that outside influence was brought to bear on the subject, with the result that the electric experts who were called in to advise were told, practically, that if Dowson or some other producer-gas plant was put in, it would be a rival to the coal-gas plant. The scheme was therefore knocked on the head; and the electrical engineers had no alternative but to advise the provision of steam-driven plant. Although a steam-driven plant had not been absolutely decided upon yet, it was almost as good as settled; and he should like to ask Mr. Paterson or Mr. Dellwik whether the Dellwik process could be used like a carburetted water-gas plant—for supplying both illuminating gas and straight water gas at will for gas-engines, and particularly whether there would be any danger of a workman, by carelessness or otherwise, allowing the non-carburetted water gas to pass into the coal-gas holder, which would, of course, have a very bad effect upon the illuminating power of the town's gas. At the time the electric light scheme at Kendal was under discussion, he wrote to Mr. Paterson for some information on the subject of water-gas plant, as it seemed to him (Mr. Ritson) rather important and worthy of consideration. If there were no difficulties of the kind he had hinted at, it would help him in recommending his Committee to give further consideration to the question of fitting up a water-gas plant instead of steam, as the electric lighting station was to be erected at the gas-works. Towards the close of the paper, it was stated that the Electrical Engineer of Birkenhead gave certain figures with reference to the cost of water gas and steam power; and he (Mr. Ritson) should like to ask whether the gas-engine plant was actually in use for electric lighting purposes or for tramways, as there was certainly great advantage shown in the cost of water-gas fuel over coal.

Mr. John West (Manchester) congratulated Mr. Paterson on his valuable paper. Their friends on the Continent were giving this matter particular attention, as he had found when recently travelling there; and he would suggest that members should look over the figures contained in the paper very carefully, and note the advantages which were shown. For a long time he had advocated in the Manchester district—among manufacturers, tool makers, and machinists—that they should put in gas-engines wherever they possibly could, or use gaseous fuel for driving their machinery—not altogether because of its cheapness compared with steam, though some years ago he made some elaborate experiments and proved to his own satisfaction that Manchester gas (which was of over 20-candle illuminating power), at 2s. 6d. per 1000 cubic feet, would be as economical as Dowson gas. After the excellent results just brought forward, however, he must withdraw these experiments. At the time he made them, the gas-engines in vogue were not very suitable for the purpose—at any rate a gas-engine which would do for one kind of gas wanted a good deal of modification to work satisfactorily with the other. Several machinists in Manchester had put down gas-engines to lines of shafting with great advantage and economy; and this showed the utility of gaseous fuel, and that it was not necessary to supply it cheaper than gas for lighting purposes. He (Mr. West) had a long conversation with the late Colonel Dyer on this subject; and he told him that they were using gas-engines very largely indeed at Messrs. Armstrong's works at Newcastle—in fact, he said they were bound to use them because they were so reliable. In boring large guns for instance, when the mechanism was once started, it must go on day and night till it was finished; and perhaps for a fortnight the machine never stopped. The motive power employed must, therefore, be steady and invariable. Steam-engines, as a rule, could not thus be worked night and day, as it would involve keeping the boiler-man there all the time, and even then occasionally perhaps, the stoking might not be kept regular. With a gas-engine no extra man was needed; and yet reliance could always be placed on having the pressure desired. It was therefore better and cheaper, taking all things into consideration, than steam power. The question of producing power for electric lighting and other purposes was now causing many people to consider this subject very carefully. In his own works, if the old system did not exist, he should put a gas-engine on

every line of shafting he had; and he believed gas-engines would be used more than ever if gas engineers would only bring their advantages prominently before the public.

Mr. F. W. Cross (Lea Bridge) said it appeared clear that straight water gas for driving a gas-engine was cheaper than coal gas; and while Mr. Ritson was speaking, it struck him that the straight water gas might be used in a manufactory for the driving of gas-engines, and that a benzol carburettor might be used for the enrichment of the gas for lighting purposes. They knew the cost of the straight water gas; and he should be glad if the author could give them the cost of enriching such gas with benzol, to (say) 18 or 20 candle power. The plant could then be used to double advantage; and it would overcome the difficulty some might have in storing the gas.

The President said Mr. Paterson had only been dealing with gas for the purpose of power, not for illumination.

Mr. Paterson, in reply, said this subject was one which involved the use of a lot of figures; and probably some members might give their opinion upon it in the "Journal," after studying them, because it could not be very well discussed in detail. With regard to Mr. Ritson's question, about the combination of carburetted water gas and pure water gas, in the case of Birkenhead, they had three generators, and by simply operating two valves, these generators could be shut off for straight water gas or reconnected with the apparatus for carburetting and superheating at will. It was a simple attachment to the ordinary plant; and there was no difficulty about it. Mr. West had spoken of gas-engines being taken up more and more; and he thought engineers were generally finding out their advantages. Even illuminating gas sold at a fair price would beat steam; and if towns would take up the thing further, and put down plant (chiefly to start with) for power on tramways, it would be worth their while afterwards to have a system of mains for supplying power all over the towns. He had not gone into the question of lighting power. With the Dellwik plant, all the heat of the coke was retained in the generator, and made available in a gaseous condition. None of it was blown away as in the Birkenhead carburetted water-gas plant and in the ordinary method. There it was necessary to blow out the carbonic oxide into the carburettor and superheater, where a second air blast met the gas to bring about combustion; and a certain amount of gases were wasted in heating these vessels up. But in the case of a water-gas plant there was simply a generator; and all the heat was utilized there.

THE INFLUENCE OF CARBONIC ACID ON THE COMBUSTION OF COAL AND CARBURETTED WATER GAS.

By Frederick G. Dexter, of Winchester.

The subject of this paper is not perhaps a very attractive one; but it may prove of service to those who, like myself, have wished to determine the influence of carbonic acid in consequence of the greater proportion of this gas present in carburetted water gas. It has been known generally that carbonic acid has the effect of lowering the illuminating value of coal gas; but the published information has no reference to the particular quality of the gas, and gives no information as to the effect upon the calorific value—information which, in these days of incandescent lighting, and the general use of gas as a fuel, becomes of importance. The tables which follow give the results obtained, in illuminating and calorific value, with eight samples of coal and carburetted water gas, with regular increments of 2½ per cent. of carbonic acid up to 10 per cent.—a range sufficient to cover any practical application. The diagrams show the curves obtained with these experiments, and enable the conditions obtaining with any intermediate percentage of carbonic acid to be observed.

Illuminating Value.—Dealing with coal gas first, it will be seen that the samples range from 18·4 candles value down to 15·6 candles; and the writer would bring to notice that the percentage of loss increases from 32 to 43 per cent. In other words, the poorer the initial quality of the gas the greater the mischief wrought by the presence of carbonic acid. The curves show further that, taking any given quality, the loss is uniform for each per cent. of carbonic acid throughout the range. The four samples of water gas range from 21·6 candles quality down to 11·7 candles. Referring to the table, it will again be seen that the loss due to the presence of carbonic acid is in increasing ratio the poorer the initial quality of the gas—varying from 34 up to 68 per cent. Comparing these results with those of coal gas, it would appear that carburetted water gas is the more susceptible to the influence of carbonic acid. As before seen, in the case of each gas the higher candle powers suffer the least. But at the same time, at corresponding candle values, coal gas appears to suffer less from the presence of carbonic acid than carburetted water gas. Probably the explanation lies in the fact of the superiority of coal gas in calorific value under parallel conditions.

Calorific Value.—The determinations of calorific value have been made with the same qualities of gas in order to afford a better comparison and avoid confusion. The percentage loss for each quality is, as the diagram shows, quite uniform throughout the range of carbonic acid, varying with coal gas from 11 to 21 per cent., and with the carburetted water gas from 13 to 19 per cent. The increased ratio of loss the poorer the initial gas, is to be observed as in the case of illuminating power; and holds good for both coal and carburetted water gas. The one apparently conflicting curve is that of the lowest quality water gas 11·7-candle; but as there appears to be a reason for this at very low qualities (which is under investigation), the writer will not delay with any theory now, especially as it is below the minimum candle value likely to be distributed. A heavy black broken line will be noticed. This is a 50 per cent. mixture of carburetted water gas of 21·6-candle power and coal gas of 18-candle power, plotted as a mean of the known values on the diagram. This mixture was tested independently for calorific value at 3·6 per cent. carbonic acid, and found to give 149 calories against the curve indication of 150 calories; and as the illuminating value tested independently was also found to be the exact mean, the writer feels satisfied that mixtures of coal gas and carburetted water gas bear values proportional to the quality and percentage of each gas present.

It will be noticed that the whole of the curves of the calorific value of carburetted water gas come below those of coal gas; the calorific value of even 21·6-candle power water gas being slightly under that of 15-candle power coal gas. An average of the four qualities of the two kinds of gases given shows a balance of 12 per cent. in favour of coal gas. This brings the writer to mention that the experiments were commenced under the idea that the determination of the influence of carbonic acid would show that the presence of this gas played an important part in the difficulty arising with gas-fires and similar atmospheric burners—"lighting-back"—with certain percentages of carburetted water gas. This, however, is not the case. The cause of the trouble is simply that carburetted water gas, of even very high illuminating value, requires considerably less air for combustion than coal gas. Failing to find that the removal of carbonic acid materially influenced the "lighting-back" with water gas, arrangements were made to measure the air supply required to supply a gas-fire consuming 24 cubic feet per hour. It was then found that the quality of 18-candle coal gas shown upon the diagram, burning at the rate of 24 cubic feet per hour, required an air supply of 100 cubic feet per hour to produce the shortest possible green inner cone without firing-back, and an air supply of 75 feet per hour to just remove luminous streaks in the flame—a flame, of course, much greater in length, but of correspondingly low temperature.

With the 21·6-candle carburetted water gas on diagram, however (the fire consuming 24 feet per hour as before), the maximum air supply could not be made to exceed 76 feet per hour without "lighting-back;" and the minimum air supply was reduced to 50 cubic feet per hour. As the minimum air supply of the 18-candle coal gas, and the maximum air supply of the 21½-candle water gas are in line (75 cubic feet per hour air for a 24-feet per hour fire), it follows that, with a choice of such qualities, the fire would be of little heating value in the one case, and liable to "light-back" in the other; and it points to the fact that for effective heating, as well as economic reasons, the best results are to be found with a mixture of low-grade coal gas, and comparatively high candle value carburetted water gas. In fact, there is little doubt that a point may be found where the air supply required for low-grade coal gas intersects that for a high candle value carburetted water gas, which would afford conditions the least

DIAGRAM 1.—*Illuminating Power and Carbonic Acid.*

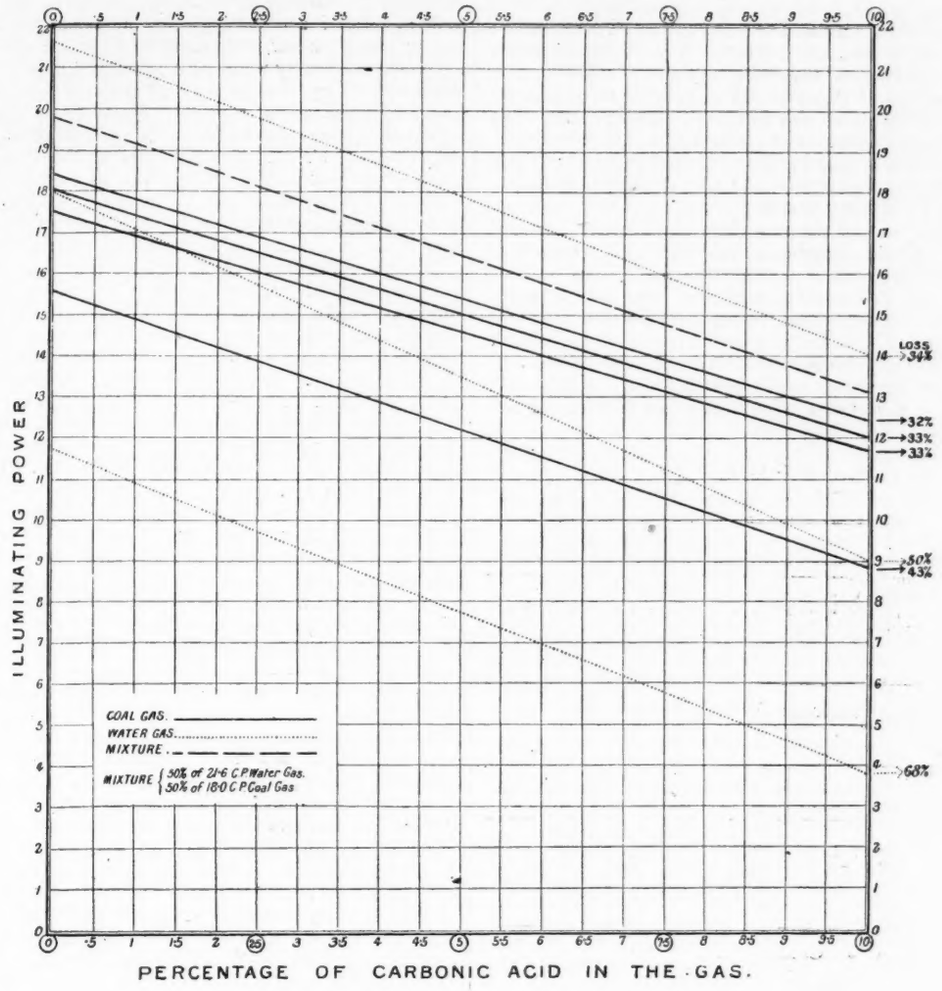
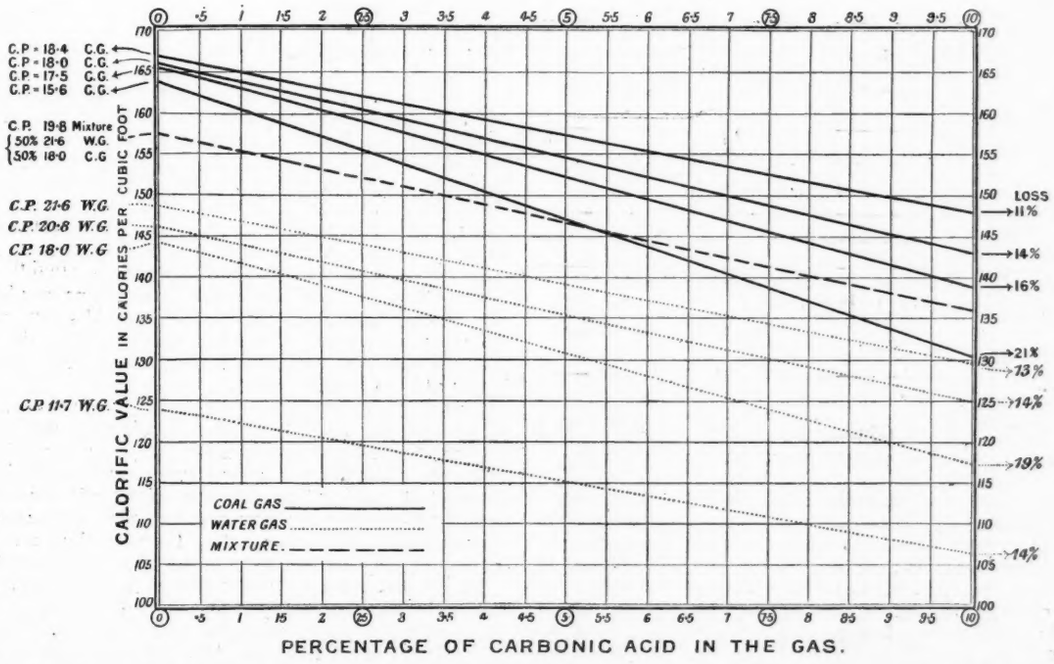


DIAGRAM 2.—*Calorific Value and Carbonic Acid.*



liable to disturbance for those enabled to supply a constant percentage of carburetted water gas, and possibly determine reasonable limits for those obliged to alternate between coal gas alone and a mixture. Experiments with this object are in hand. One other point which may prove of service is that it has been found that the volume passed of 19·8-candle carburetted water gas is 10 per cent. less than the volume of 15·6-candle coal gas under the same pressure (1·5 inches).

It was very much desired to have introduced a wider range of qualities of gas than here given, together with further trials with mixtures, and particularly to have

recorded the corresponding flame temperatures to the calorific value. But it may be pointed out that, even with the work here recorded, for the sake of accuracy the percentage of carbonic acid had to be determined both before and after each reading, and together with the calorific and illuminating tests, has involved over 160 experiments. Further, every set of experiments of calorific and illuminating values throughout the range of carbonic acid was effected upon one sample of gas within 24 hours (as a longer period than this was found to cause disturbance); and each sample has been taken from bulk under ordinary conditions of working. From this, it will be realized that the work involved has been far greater than the simple finished results of the diagrams indicate, and the main cause that more could not be offered at this meeting. The work is being followed up, however, with the intention of completing information upon the points mentioned; and it is hoped it will awaken sufficient interest to warrant a further communication, and perhaps lead others to investigate.

Mr. Mackay has been working with me upon this subject; and my acknowledgments are due to him for the great assistance and help afforded.

Coal Gas.

Calorific Values.

Percentage of Carbonic Acid Present.	18·4 Candle Power.		18·0 Candle Power.		17·5 Candle Power.		15·6 Candle Power.	
Nil.	167		166		166		164	
2·5	162	Loss	161	Loss	159	Loss	155	Loss
5·0	157	11 Per	155	14 Per	152	16 Per	147	21 Per
7·5	152	Cent.	149	Cent.	146	Cent.	139	Cent.
10·0	148		113		139		130	

Carburetted Water Gas.

Calorific Values.

Percentage of Carbonic Acid Present.	21·6 Candle Power.		20·8 Candle Power.		18·0 Candle Power		11·7 Candle Power.	
Nil.	148		146		144		124	
2·5	144	Loss	141	Loss	38	Loss	120	Loss
5·0	139	13 Per	135	14 Per	131	19 Per	115	14 Per
7·5	134	Cent.	130	Cent.	124	Cent.	111	Cent.
10·0	130		125		117		107	

Coal Gas.

Illuminating Values.

Percentage of Carbonic Acid Present.	18·4 Candle Power.		18·0 Candle Power.		17·5 Candle Power.		15·6 Candle Power.	
Nil.	18·4		18·0		17·5		15·6	
2·5	16·9	Loss	16·5	Loss	16·1	Loss	13·9	Loss
5·0	15·4	32 Per	15·0	33 Per	14·6	33 Per	12·2	43 Per
7·5	13·9	Cent.	13·5	Cent.	13·1	Cent.	10·6	Cent.
10 0	12·4		12·0		11·7		8·9	

Carburetted Water Gas.

Illuminating Values.

Percentage of Carbonic Acid Present.	21·6 Candle Power.		18·0 Candle Power.		11·7 Candle Power.	
Nil.	21·6		18·0		11·7	
2·5	19·7	Loss	15·7	Loss	9·7	Loss
5·0	17·8	34 Per	13·4	50 Per	7 8	68 Per
7·5	15·9	Cent.	11·2	Cent.	5·8	Cent.
10 0	14·0		8·9		3·8	

Discussion.

Mr. J. P. Leather (Burnley) said it was rather difficult to realize from merely hearing a paper of this kind read, the meaning of all the figures. It struck him that in the tables showing the effect of carbonic acid on the illuminating power of gas that the loss in candles was constant for every additional percentage—the lines on the diagram being straight, and, not only so, but they were fairly parallel. The addition of 2½ per cent. of carbonic acid produced about the same effect, expressed in candles, on 18-candle gas as on 15½-candle gas; there being a loss of 1·5 candles in the one case, and 1·7 candles in the other. In the case of carburetted water gas, the lines were, however, not so parallel. The author said that on the lower illuminating power gas the effect was much greater. It was somewhat greater, and appeared much greater when expressed as a percentage, but not very much greater when expressed in the number of candles. Every 2½ per cent. of carbonic acid added to a 21-candle power gas made a difference of 1·9 candles; but the same percentage added to 11·7-candle power gas made a a difference of 2 candles. The intermediate illuminating power was, however, rather different; and it seemed difficult to understand why with 21-candle gas there should be a difference of 1·9 candles with 2½ per cent. of carbonic acid, and about the same with 11·7-candle power gas, but with 18-candle power gas the loss was 2·3 candles. When expressed in the form of actual loss in candles, the results seemed more easy to compare than when expressed as percentages. They must all be grateful to Mr. Dexter for undertaking these experiments; and he had no doubt at all that the figures in the paper would be of great use.

Mr. James Stelfox (Belfast) said that, like the previous speaker, he had not been able to digest all Mr. Dexter's figures. In the table at the end of the paper, he noticed a remarkable change in the loss of calorific value of carburetted water gas as compared with coal gas of equal illuminating power. It amounted, with 21·6-candle power gas, to 13 per cent. Then it rose to 14 per cent. and 19 per cent. with 20·6 and 18 candle gas respectively; and then it dropped to 14 per cent. for 11·7-candle power. So that there seemed to be quite a break in the line. In respect of calorific value Mr. Dexter's figures were very severe. He (Mr. Stelfox) did not think they had had any experience of a loss of heating power anything like that. Professor Lewes, he thought, put the difference in value, of equal qualities, at about 5 per cent. in favour of coal gas; and if there was such a difference in practice as Mr. Dexter stated, he (the speaker) thought they would have heard more about it. In his own case, they made 17 or 17½ candle coal gas, and mixed it with 22-candle water gas. It varied slightly from day to day; but they had no complaints as to the difference of power. As to the effect of carbonic acid on the illuminating power, some years ago they made a number of experiments and satisfied themselves, by passing the gas in one case through a small lime purifier, while in the other they let it go through oxide only, that for each 1 per cent. of carbonic acid, there was a loss of illumination of 0·7 candle. That was, working with nearly 4 per cent. of impurity, the loss was practically 3 candles, which they had to make up with oil. As to other reasons for the loss of illuminating power, the very fact of allowing the carbonic acid to remain in the gas would give an increased specific gravity to the mixture; and he thought that this had a great deal to do with it. From his own experience, he could say confidently that if the full value of carburetted water gas was to be obtained, it must be by the use of burners with large apertures. The flame of carburetted water gas was more stable, and did not require so much oxygen for its proper consumption; and if small aperture burners were used, the loss of illuminating power was much greater in proportion than with coal gas. This might account for the trouble which had been experienced in some cases where gas of 20 or 22 candle power had been supplied to be consumed through burners with very small apertures—suitable for gas made of that power by the aid of cannel. When the carburetted water gas was used, there was a considerable loss of light; but this was accounted for by the unsuitability of the burner. There was much more necessity for having the right kind of burner in the one case than in the other.

Mr. C. S. Ellery (Bath) felt in the same condition as Mr. Stelfox, and hoped the Council would again consider the suggestion made some time ago of getting the papers into the hands of members earlier, so that they might be better able to discuss them. He should be glad if Mr. Dexter would explain where he got his 10 per cent. of carbonic acid from. Did he introduce it purposely into the gas, or was it there in the ordinary course of production? With regard to the size of apertures in burners referred to by the last speaker, the difficulty might, of course, be got over by increasing the pressure. In their own case, when they sent out a larger percentage than usual of carburetted water gas, they increased the initial pressure of supply.

Mr. R. G. Shadbolt (Grantham) thought Mr. Dexter was to be congratulated for his courage in putting forward so plainly the information he had obtained. One point which had occurred to him (Mr. Shadbolt) was that it behoved them more than ever to go in for thorough purification, particularly of carburetted water gas. With regard to Mr. Stelfox's remarks, he understood him to refer to the consumption of gas in an ordinary manner; but he took it that in the case of Mr. Dexter's experiments the tests were

made in the laboratory, where the conditions would be adjusted to the requirements of the gas. Taking into consideration the very thorough manner in which the author of the paper had gone into the matter, and made so many experiments, it was nothing less than an "eye-opener" to gas engineers as to the effect of carbonic acid on the illuminating and calorific values of gases. He (Mr. Shadbolt) had not sufficient temerity to enter on a criticism of the figures without a little preparation; but he must express his personal thanks to the author for the amount of trouble he had taken, and the courage he had displayed in bringing forward these extraordinary figures, which, roughly, showed about double the deterioration usually attributed to a given proportion of carbonic acid gas.

Mr. DEXTER said he hardly expected it would be possible to have any discussion on the paper. As he mentioned at the commencement, the subject was not very attractive. Anybody who attempted to get these different percentages of carbonic acid into these mixtures would find it was rather awkward work, and once or twice his assistant had been gassed pretty severely. With regard to Mr. Leather's statement concerning the loss in illuminating power, he would point out that it was misleading to judge the effect on the different values of carburetted water gas and coal gas by the apparent parallelism of the lines of the diagram. The choice of scale influenced the appearance.

Mr. LEATHER said he was not referring to the inclination of the lines, but to the lines being of the same inclination.

Mr. DEXTER said almost at the beginning of his paper he had referred to one apparently conflicting curve—viz., that of the lowest quality of water gas. But he was perfectly certain the figures were correct. His idea was that, inasmuch as the illuminating power of the gas suffered in greater proportion than the calorific value, as the lower qualities of the illuminating values were reached there was less and less illuminating matter to deal with; and consequently the percentage of loss became lower. He believed that a point would be found, low down in the scale, where the actual loss in calorific value became very small as compared to the loss in illuminating power. But this loss was still under investigation. Mr. Stelfox had referred to the information published by Professor Lewes. He did not know to what extent that gentleman had gone into this question; but he did know that, for every single percentage of carbonic acid made in these mixtures, the gas had been tested by himself and his assistant throughout the whole range. If therefore the results had gone down to a drop of 3 or 4 candles, and then the following test (with a higher percentage) failed to maintain the same curve, they would have found a break. But inasmuch as, with every additional percentage, another check was obtained of the work which had gone before as well as that which followed, he was justified in saying that the results were absolutely correct. He thought it would be found on investigation that the information relating to the influence of carbonic acid hitherto published was far too general. It simply stated that, with the addition of so much carbonic acid, there was a certain percentage of loss; but it did not tell what was the quality of the gas, which was a very important point. He might mention that, as the result of these experiments, he had prepared a great many diagrams which he believed would enable him to establish a law for getting the illuminating power from the calorific value of different gases—that it would be possible, supposing the calorific value of a gas and the percentage of carbonic acid in it were known, to tell what the illuminating value of it was without a photometer. He did not, however, wish to publish these results until he had carried out further experiments on the whole range. Mr. Ellery asked how he got the 10 per cent. of carbonic acid into the gas. He had deliberately gone to a higher proportion in the mixture than was likely to be sent out from any works. His aim was to obtain his gas purified of carbonic acid. Then it was tested for its illuminating and calorific value; and afterwards a percentage of carbonic acid was added, and the test carried out again, and so on, right through the whole series, until the 10 per cent. of carbonic acid was reached.

THE ADVANTAGES OF THE REGENERATIVE SYSTEM FOR SMALL GAS-WORKS.

By JOHN LYNE, of Wexford.

It is intended in this paper to indicate the many advantages which may be expected to result from the adoption of the regenerative system of firing in works producing 30 million cubic feet annually or less. The object of the writer is to encourage to a decision those who may be still hesitating about introducing the system into their works. At the Wexford works in the winter of 1896-97 there were practically no retorts in reserve; there was an increasing gas consumption, and short storage. The retort-house was old and small; and there was then no available ground on which to erect a new, or to lengthen the old one. Some of the arches in one half of it were worn out; others were too small. The clearing away of these would have given space for the additional retorts necessary to provide against a steadily increasing consumption for three or four years, even with the old system of firing. With the introduction of the successful system of regenerative firing now in operation, however, there is every reason to believe that the existing retort-house will be found adequate for a longer time, unless, owing to more rapidly increasing consumption, the building of a larger one adapted for slopers and coal and coke handling appliances may be justified, or carburetted water gas may be resorted to.

Although it was not possible to increase the length of the old house, it was easily and cheaply made wider; and this was necessary even if the old system of firing had been continued, in order to allow the use of a longer retort than those in the old arches, and to give more room for comfortable working. The promise which the new system gave of an increased make per mouthpiece, was what chiefly induced the writer to think seriously of its adoption. In first considering the question, not the least difficulty presenting itself was the possibility of having to contend with water, and the consequent greater expense. The works stand on land which has been reclaimed from the sea; and the retort-house floor is only a little above high-water level.

In making excavations at any time for pipes and other purposes, water was always present. The ground within the area of the building had to be excavated to a depth of 10 feet, and the old walls underpinned. There was also a very wide and deep stone foundation extending under the old arches, which had to be blasted out, to prepare for the excavation and the underpinning. There was the chance of the installation not working well when finished, or of getting fused to such an extent with high heats as to be almost useless, which has happened in some cases. There was also the important question of the much larger outlay which would be required for the new system.

The writer had, therefore, to carefully consider whether he would make the plunge or not; for he was not in the position of one who could easily spare space for an experiment, and failure in his case would mean disaster.

The trouble from the presence of water proved of little consequence. A small pump was able to dispose of it while the work was proceeding; and the only means taken for dealing with it after the excavation was finished, was in the laying of a good drain all round the outer edge of the space to be occupied by the settings and the pit. A small drainage-receiving tank, holding about 160 gallons, was sunk just below the track of the drain; and a pipe from this was connected with the suction-pipe of the pump supplying the scrubbers. The producer furnaces being supplied with water only, the small tank would have been required in any case, to take the surplus water from the producers. It is necessary to pump the tank only once in twenty-four hours.

The results in working have been most satisfactory. At a moderate heat, the make per mouthpiece—six-hour charges—with through-and-through caking coal containing a large proportion of slack of a quality slow to carbonize, and giving about 14 cwt. of coke to the ton, is 7000 to 7500 cubic feet. One-third of the retorts are ovals, 22 in. by 15 in. by 9 ft. long; the others being of ⏢ section, 22 in. by 15 in. by 9 ft. long inside. The heats are regular and easily varied at will. The make of gas is so reliable that, though the storage for the winter of 1897-98 was little more than equal to half the heaviest twenty-four hours' consumption, there was not the least anxiety about being able to maintain an ample supply of gas. The wear and tear so far is hardly worth mentioning—only a few bricks at the back of the producer where the relieving bars touch, and some slight repairs to some of the producer charging-doors and frames. The retorts and brickwork about them appear quite perfect. The saving effected in coal, coke, and wages, has been sufficient during the fifteen months the furnaces have been in use to more than

pay the cost of all work below the charging-floor level (and of the floor as well)—that is, everything which forms part of the producers, regenerators, &c., as the following figures will show:—

Direct Firing.—Year ended June, 1897.

Coal carbonized		3167 tons.			
Total make		28,503,000 cub. ft.			
Make per ton		9,000 ,,			
Coke sold		£974 17 9			

Regenerators in Use Part of Year.—Year ended June, 1898.

Coal carbonized		3218 tons.			
Total make		30,414,000 cub. ft.			
Make per ton		9,450 ,,			
Gain of 450 cubic feet per ton over make per ton in 1897 = 161 tons of coal, at 13s. 4½d. per ton = saving in coal of				£107	13 4
Coke sold at same price as in 1897	£1,091	6 10			
Sold in 1897	974	17 9			
	£116	9 1			
Less 9 cwt. per ton for sale on 51 tons more coal used than in 1897 = 22 tons 19 cwt. of coke, at 15s. per ton	17	4 3			
Gain in sale of coke over 1897				£99	4 10

Year ended June, 1899.

Coal carbonized*		3209 tons.			
Total make		30,662,000 cub. ft.			
Make per ton		9,555 ,,			
Gain of 555 cubic feet per ton over make per ton in 1897 = 197 tons of coal at 14s. 6d. per ton = saving in coal of				£142	16 6

* Same kind of coal, but higher in price.

Coke sold in year ended June, 1899	£1326	9 4			
Less amount realized from slight increase in price from Dec., 1898, to June, 1899	90	13 3			
	£1235	16 1			
Coke sold in 1897	974	17 9			
	£260	18 4			
Less 9 cwt. per ton for sale on 42 tons more coal used than in 1897 = 18 tons 18 cwt. at 15s. per ton	10	8 6			
Gain in sale of coke over 1897				£250	9 10
If direct firing had been in use winter 1897-8 and winter 1898-9, there would have been paid extra in wages at least				20	16 0
Total saving since regenerative system was introduced				£621	0 6
Cost of regenerators and of all below floor-line, including steel floor				450	0 0
Balance over sum expended				£171	0 6

The total gain of £621 is equal to a profit of 138 per cent. on capital expended.

Should the result of next year's working be as good as it was for the past year, the gain would more than pay for the cost of all retorts, mouthpieces, ascension pipes, and hydraulic mains.

There has also been another saving of no small importance—a saving of anxiety and of time—for the writer can truly say that for the many years he has been in his present position he was never so free from uneasiness about having a good make of gas, or felt so much at liberty in the winter months to devote his attention to other important matters. Those of his readers who may have neither a day nor a night foreman to see that all is done in the retort-house that should be done, and who may have often been through a twenty-four hours' watch as he has, with only a temporary good result, will be able to appreciate such a saving and set whatever value they think proper on it.

It has frequently been stated that stopped ascension-pipes are a greater trouble consequent on the higher heats with the regenerative system than with the old system. The writer has not, however, had any difficulty from stopped ascension-pipes, nor any pitching of the hydraulic mains, with the new system. The stokers are relieved from much arduous toil, as in feeding the producers, the hot coke is drawn direct into them, and the work of clinkering is light compared with direct firing. Another advantage, of no small importance, is a considerable reduction of Sunday labour. The pit was certainly rather hot as at first arranged. This was quickly remedied by altering the position of the ventilating grates, and by running a small ventilating-shaft from the pit up outside the retort-house wall; but in the greatest degree, by placing a 4½-inch brick lining as a non-conductor just above the level of the clinkering door, and continued up to the charging-floor.

The accompanying diagrams show the simplicity of the system. It is manifest that the satisfactory results obtained are due to it; but the writer considers that all the good effects do not arise from the "regeneration" which takes place. He agrees with those who believe that many of the advantages ascribed to the system of "regeneration," so called, are really due: (1) To the excellent method of feeding red-hot coke at all times into the generator; (2) to the more complete combustion of the coke fuel in the producer, a very much less proportion of unburned coke being removed with the ash and clinker than is the case with direct-fired settings; (3) to the small quantity of cold air which can be drawn in during the short time the feeding cap is off until the coke begins to pour in in a constant stream; (4) to its being impossible with the exercise of ordinary care for any cold air to be admitted while clinkering is being done. With the system in use there is no doubt but that much is gained from the better distribution of heat resulting from the gas-burner extending from the front to the back of a setting, and from well arranged exit ports for the waste gas, and to the efficient control there is over the admission of primary air by means of a well-designed and a well-made clinkering door. Not a little of the saving of heat must be due to its conservation, quite apart from some heating of the secondary air by the hot-gas flues below the retorts. It is known that with direct firing, much heat is wasted by passing into the ground beneath the floor of each arch. There would probably be further saving of heat with regenerative settings if they were built on dwarf arches, or on arched blocks, so as to have as little contact with the ground as possible; the arches to cover the whole ground under the producer, secondary air channels, and waste-gas flues—the waste gas to be finally conducted through the dwarf arches to the chimney.

[Appendix.]

Wexford Coke Sales, Year Ended June, 1899.

Analysis.

Cash received, less deduction for increased price				£1235	16 1
	Tons	Cwt.			
Coke sold by weight	432	4		£307	12 5
Breeze	238	12		29	0 11
	670	16 = 13,416 cwt.		£336	13 4
Bushels sold, 53,947, at 4d. =				£899	2 9

Weight of bushel 3·3 stones as sold in Wexford, equal to 23,253 cwt., weight of coke sold by measure

13,416 ,, ,, weight

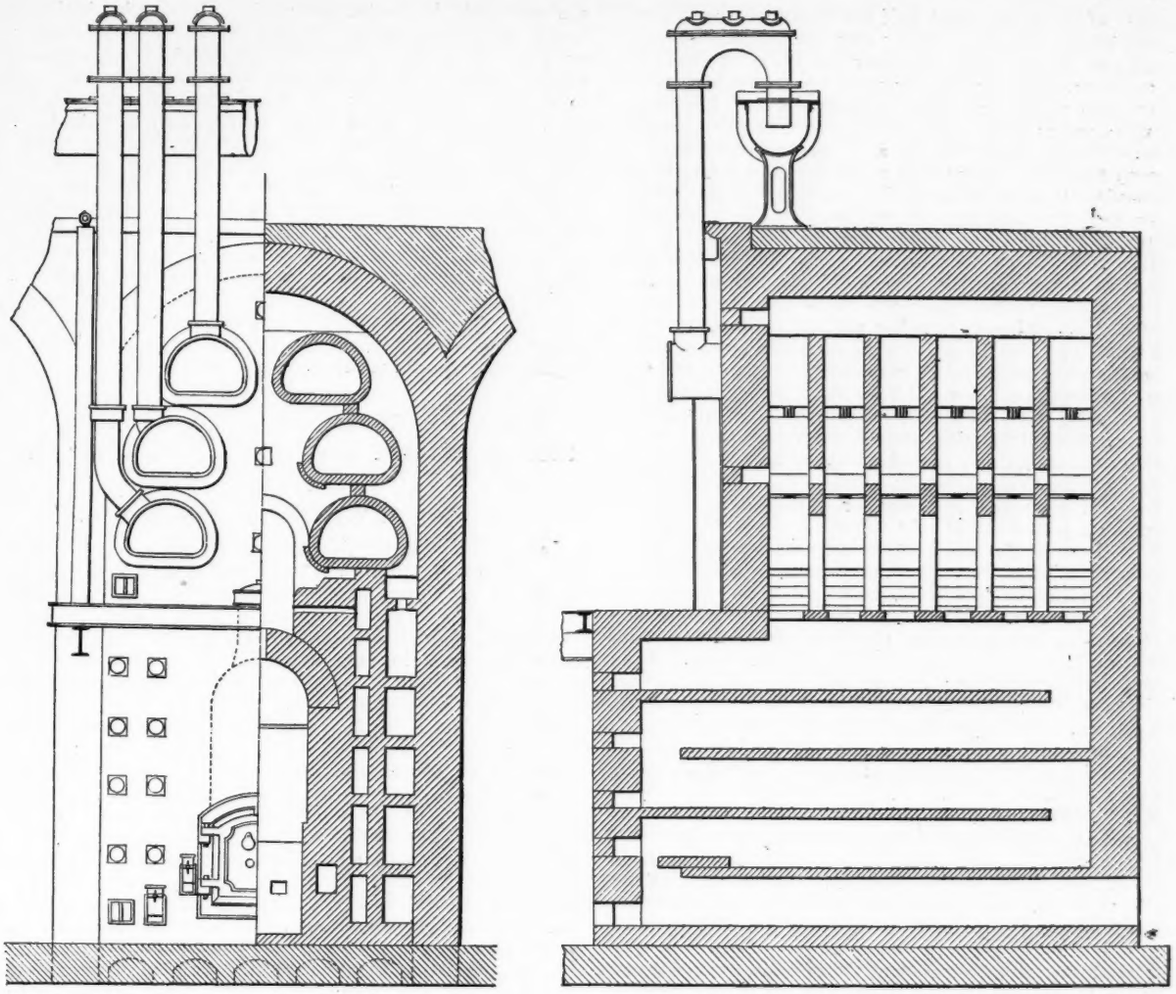
Total sold . . . . 35,669 cwt.

Coal carbonized . . . 3209 tons.

This shows that 11·1 cwt. of coke were sold per ton of coal carbonized. The above figures have been given to show how the hundredweights sold per ton of coal have been arrived at, and lest anyone might think from going over the other figures in the paper that only 9 cwt. per ton of coal was sold. The 9 cwt. was roughly selected to correct for the number of tons of coal used—say, 1899 over what was used in 1898. The writer sees now that he should have calculated on 10 cwt. at least of good saleable coke per ton for the extra 42 tons of coal used in 1899. However, this correction will only make a very small difference in the total profit of £621. The correction would be £617 10s., instead of £621, and is equal to a profit on the capital expended of 137·2 per cent., instead of 138 per cent.

Discussion.

Mr. A. Macpherson (Kirkcaldy) said he could quite confirm what the author had said. As engineer to a number of gas companies, he had taken out old benches and introduced regenerative settings with the greatest possible advantage; and he might say that, like Mr. Lyne, the managers now enjoyed a much more peaceful and tranquil life. The only criticism of the paper he had to make was that he thought Mr. Lyne would have got equally good results without going quite so deep. His experience had been that with about half the regeneration which Mr. Lyne showed in his diagrams, they could get most excellent results. With direct firing on the old system at one works they only produced 7500 to 8000 cubic feet per mouthpiece; but they were now producing 9500 to 10,000 cubic feet with the greatest ease.



He would strongly recommend all managers of small gas-works to introduce this system, which they would find to be most profitable in every way. Even on a modified scale, semi-regenerative settings had also been a great success in many places—simply heating the air before it was introduced. It paid in a small gas-works even in the form of simply running a few flues below the floor-level to heat the air at the expense of the oven, by bringing the heated air in contact with the producer gas. Of course, this was not regenerative firing; but he had got excellent results in this way, where it was impossible to get down—the ground being hard rock. In one case where he introduced regenerative settings, they were much annoyed with stopped ascension-pipes; but he found this was simply for want of ventilation. The retort-house was not ventilated; and the ascension-pipes got very hot, and began to stop. Another way of preventing this was by constantly running some cold ammoniacal liquor into the hydraulic main. This kept the light oils from leaving the tar, and thus prevented the deposit of pitch; the tar flowing away freely. One need hardly look to the figures given in the paper to see that financially the system was most successful.

Mr. H. Tobey (Malton) thanked Mr. Lyne for introducing this subject in a way which commended the system to companies whose make was not less than 30 millions per annum. A short time ago a statement went the round of the papers that it did not pay to introduce regenerative firing in works making less than 50 millions; but this conclusion was entirely confuted by Mr. Lyne's contribution to the proceedings. He himself would go a step further, and say they should be put into works of much smaller size, and with very great advantage. Even if a regenerative furnace could not be introduced a generator furnace certainly could be, which was less costly, and perhaps more simple, if not quite so economical. He had put generator furnaces into works where the make was less than 10 millions, and succeeded in getting extraordinarily good results. A great mistake was made in small works in putting too many retorts in one furnace. These furnaces were expensive, and there was a desire to have as many retorts as possible round them. The result was that they were often lying off for a great length of time, especially if the gasholder room was not very large. To work a furnace advantageously, all the retorts should be pretty constantly going; otherwise stopped ascension-pipes were liable to result, and the retorts burnt out much more quickly, being exposed to a great heat during hours of idleness. The result was that the benefit anticipated was not realized. By having a smaller number of retorts, and a larger number of settings, the fires could be raised as wanted, and so the make adapted to the demand.

Mr. E. H. Stevenson (London) also congratulated Mr. Lyne. In his opinion, regenerative firing was the best thing possible in the very smallest works. He had two very small works in his mind now (one of them under his charge), both with regenerative firing. One he did not know before the new furnace was put in; but the make of gas there was only about 3 or 4 millions a year. The other was under his control now. They had some old settings—a five, a three, and a one; the make being from 3 to 4 millions a year. The retorts were not big enough for the winter make; so he determined to put in a regenerative setting of six retorts in place of the one and three. They only had one man at work; and since that time they had used much less fuel, and less coal in proportion to the make of gas, and had had no trouble either with burnt-out retorts or stopped ascension-pipes. When the man went off for a rest, he shut down all the air inlets and the damper; and the setting heated up again in about half-an-hour's time as well as before, and did not get over-hot. He believed, therefore, even for the smallest gas-works, regenerative firing was beneficial.

Mr. G. R. Hislop (Paisley) said he had known several works using regenerative furnaces down even to a make of 3 millions per annum. In one case they made the same

quantity of gas from about half the quantity of coal; and instead of four retorts working day and night, the same quantity of gas was made with four charges of two retorts in the 24 hours. There was very great advantage in works of the smallest size in being able to damp-down the furnaces at any time, and in an hour or so have them in full operation again. There could not be a greater mistake than to suppose that this system was not applicable to any works making less than 30 or 40 million cubic feet of gas a year, as was recently stated by a gas engineer. It was a matter of the greatest value for the smallest works.

Mr. E. W. Smith (Chelmsford) said he had listened with very much pleasure to Mr. Lyne's paper, particularly when he remembered that not long ago there was a report to the effect that a well-known speaker and writer on gas matters said that, in any works of less than 60 millions make, it was not economical to introduce regenerative firing. He was pleased to find Mr. Lyne had been able to show that he had introduced it with great success into a works making 35 millions. He (Mr. Smith) should like to have some information as to the quality of coal used, and also as to the sale of coke per ton. In the works of which he had charge, they had used a regenerative setting for some years, but could not claim a sale of 11 cwt. of coke per ton of coal. Still they were well satisfied with what they did. It was an excellent modern setting; and some six months ago he added another furnace on the same system, which was in operation for three months, and during the whole of that time a clinker-bar was never in the furnace, although the heat was maintained, and the yield per mouthpiece was very high. They used four-hour charges; but, as this bed was worked in conjunction with others, he could not give the yield per mouthpiece. As he had to do with several other small gas-works, he was pleased to hear Mr. Stevenson's statement that damping-down could be effectually carried out by closing the air supply.

Mr. T. Wilkinson (Drighlington) said he agreed generally with what had been said; but he could not agree that the regenerative system would be universally advantageous, because the conditions of companies throughout the country varied so much. It might do very well for a manager down in the South or the Midlands where they got 15s. a ton for their coke; but in the north where they used common coal, and had to sacrifice their coke at the rate of about 4s. a ton, it made all the difference. It was also well to remember that a direct-fired furnace with retorts could be constructed at the rate of about £17 10s. per mouthpiece; while if an engineer were asked to give an estimate for the construction of a regenerative furnace it would be found that it would cost about £50 per mouthpiece. Managers must therefore take into consideration the amount of coke they could sell, and then take the cost of the direct system and the regenerative system, and compare the financial results. They were told by two experts that morning that the fires could be let down, and it would only take half-an-hour to get them into full working order again; while another came directly afterwards and said it took two or three hours. He certainly thought there was no great advantage in the regenerative system for getting heats up after a delay of some hours. It was simply a question of the regulation of the dampers. Then they were told if they put in a bed of regenerative retorts as much gas was obtained with about 40 retorts as with 50 retorts on the direct system. But as "you can get no more from a cat than its skin," so if they were going to take from a ton of coal 11,000 cubic feet of gas, whereas only 9500 cubic feet were to be obtained with direct firing, he thought the quality of the gas must be deteriorated.

Mr. Lyne, in reply, said it was only right to mention at the outset that the system described was not his. He did not advocate any particular system; but he had obtained excellent results, as was shown in the paper, from the system he had in use. He could not agree with Mr. Macpherson as to the depth. He thought it was necessary to have a good depth of coke in the producer, and unless one went down low enough, this could not be arranged for. He could have had a larger make of gas per mouthpiece if he cared to work at higher heats, and especially if he were using a different class of coal. But he used Lancashire coal, which gave a great deal of coke. He stated in the paper 13 cwt. per ton, but it was really nearer 14 cwt.; and coal which gave as much coke as that was not a great gas-producing coal. He agreed with Mr. Macpherson about the ventilation of the retort-house being highly important, and also with Mr. Stevenson and Mr. Tobey as to the advantage this system would be to smaller works. From what he knew now from actual practice, if he had to do with works making even 5 millions annually, he would introduce regenerative settings without any hesitation. Once heated it was easy to maintain the heat or get it up in a short time. In his case, they did as little work as possible on Sundays. Dampers were closed a good deal late on Saturday nights, and opened early on Monday mornings; and the retorts were hot enough for full work on Mondays. The dampers were easily accessible, being nearly level with the pit-floor. With regard to Mr. Wilkinson's remarks about the high price obtained for coke in some places, it was nearly always the case that coal cost more in proportion; and surely the saving in coke would be worth something, even where coke was sold at a low price. The gain in coke for sale was certainly not the only benefit to be had from adopting the regenerative system of firing.

THE EXTENSION OF GAS COMPANIES' RESPONSIBILITY TO FITTINGS BEYOND THE METER.

By Frank A. Winstanley, of Rotherham.

In introducing this subject for the consideration of members of the Institute, I do not feel that there is much scope for a lengthy paper; but there are a few points which I wish to raise, and which will, I hope, provoke discussion. The question of control of fittings beyond the meter has been too much neglected, and deserves the earnest attention of those interested in the welfare and prosperity of the gas industry. It is to be feared that the supply of gas in the past, with some few notable exceptions, has been conducted upon lines which are too conservative to produce the best results. Gas companies have been too prone to wait, like Micawber, "for something to turn up," in the shape of applications for gas supply—hardly dreaming of pushing the sale of gas before the public, in a similar manner to that followed in other commercial pursuits. In the majority of cases, the employment of these methods means, to the commercial man, success; their neglect, failure. Certainly, in more recent years, we have partially awakened to a sense of our duties and responsibilities, and with the assistance of our friend and opponent, electricity, have shown signs of progression in the right direction, but not nearly to the extent necessary.

In the first place, it would perhaps be as well to consider for a moment, for what purpose do gas companies exist? The shareholder's answer might be expected to be "for the making of profit." This, no doubt, is the principal reason from a manufacturer's point of view; but there are others equally important—viz., the supply of their commodity to the entire satisfaction of the purchaser, and the keeping of him fully acquainted with the means of utilizing it to the best advantage. If profit be the only aim and object of a dealer, then, unless he sells the best article he can produce, at a fairly remunerative rate only, and instructs his customers as to the proper use of the same, ill success will certainly result.

Gas companies occupy an onerous position, inasmuch as they possess a monopoly for supplying the public with one of the most useful commodities known. But the tendency in the past has been to lose sight of the duty involved by the possession of such monopoly; for with gas authorities—as in water, electricity, and other monopolies—there is an important duty to perform to the public, which should be more generally recognized.

It will be well to consider a few of the defects that exist under the present conditions of gas supply beyond the meter; and here let it be understood that I am considering chiefly the supply of gas through ordinary meters. We are all aware that an improvement has taken place in one direction. I refer to the supply of gas through automatic meters, which system affords the gas company control of the internal fittings. In dealing with supply through ordinary meters, one of the principal defects of the present system is the fitting-up of premises indiscriminately by persons imperfectly trained in the theory and practice of gas-fitting work. If one only thinks of the abortions of gas-fittings and work seen on every hand, and in almost every house, of the incongruous and ridiculous methods adopted, I venture to say that this part of the subject will appeal to the feelings of every gas manager present. All

of us have had almost daily experience of the inconveniences and difficulties caused by the brilliant display of want of knowledge on the part of the "common or garden" plumber, and, indeed, by persons who are proud to call themselves gas-fitters, but who have, in reality, only just commenced to learn the merest rudiments of the art. How often do we see old (and even new) houses and premises, fitted—save the word—with ¼-inch or ⅜-inch lead piping, where it should be ½-inch or more; and this simply thrown, as it were, on to the walls, and even then having more pockets in than a man's suit of clothes. I have in my mind, in dwelling upon this matter, several cases in point, among others being a terrace of twelve houses last rented at from £28 to £32 per annum, containing from eight to ten rooms each, where the internal piping is only ¼-inch from the meter outlet, and the fittings are of the commonest description; and yet the tenants of these houses expect to be supplied with gas of the standard illuminating power, and grumble and make the gas manager's lot anything but a happy one, because they cannot understand why their light is poor—arguing that as they are paying 2s. 9d. per 1000 cubic feet, they ought to have a better light. And from this piping are supplied chandeliers or brackets in every room, and in several cases, gas-fires in bedrooms. Is it to be expected that a gas company can satisfy consumers when their fittings are of this description? No doubt the size of the pipe was decided upon by a parsimonious plumber, who had contracted with the builder for the work at a low price, intending to reap his profit by keeping the cost down, to the permanent inconvenience of the consumer, and annoyance to the gas company.

Again, in the fitting-up of two gas-fires in a certain consumer's residence, no attention whatever was paid by the plumber (the matter being entirely ignored) to the question as to whether the chimneys beneath which the stoves were to be fixed, were subject to down-draught. The result, of course, was that the gas-stoves were condemned as being unhealthy, and creating an abominable stench. Our attention was drawn to the complaint, and the fault remedied, to the delight of the consumer.

One more instance will suffice, although many could be given, and doubtless still many more could be related by my audience, of such cases. A doctor had condemned gas-fires, in consequence of his adverse experience in the use of them. His complaint was that the fumes were expelled into the room, thus rendering the atmosphere unwholesome and unhealthy; and he had forbidden the use of them by his patients. He, however, in time, happened to meet the gas manager, and thereupon took advantage of the opportunity to condemn gas-stoves. But a few questions put by the manager elicited the fact that the stoves were wrongly fixed, and the department undertook to put them right. The fault lay, as usual, with the plumber, who had fixed the stoves *minus* a flue pipe, which fact, of course, explains the reason of the "unwholesome atmosphere." Needless to say, the complaint was cured, and the doctor paid the fee.

Another defect in the present system of gas supply is the lack of periodical examination of fittings. Consider the question of burners. How many gas consumers are there who are possessed of burners calculated to give the best possible results, from both a light-giving and economical point of view? Are not the great majority of consumers attracted by a momentary impulse to buy their burners without any knowledge of the results to be obtained therefrom? This helplessness and ignorance are only what might be expected under the present *régime*; and it is high time that the innocent consumer should be protected and advised by those who are capable of doing so. And, to my mind, the most reliable adviser would be the representative of the gas authority. At present, at the time of purchase, the consumers are satisfied with the recommendations of the seller, and are, in nine cases out of ten, after buying a cheap and nasty class of burner, disappointed with their purchase. Then, assuming that in the first place, the burners were the best that could be obtained, how seldom are they examined or cleaned, and how often do the consumers hurl strong epithets at the long-suffering gas company—never for one moment considering whether the blame does not lie at their own doors? Is it not a fact that in every gas manager's experience, that most burners have been so long in use that their age cannot be gauged? And is it not also a fact, that every gas manager can relate instances of burners having been in use for many years after their efficiency had departed? I contend that this condition of affairs must, and does, greatly hinder and embarrass the progress of a gas undertaking, and remains a bone of contention as between the gas authority and consumer—thus giving the Englishman full scope for the display of his well-known tendency of grumbling unreasonably, without troubling himself to make complaint to the proper authorities.

Further, the employment of unskilled labour makes it very possible for explosions, and other accidents to occur, causing danger to life and property.

Now, a word as to cooking-stoves. Figuratively speaking, there is "something rotten in the state of Denmark" as regards this department. When one thinks of the needless amount of trouble and inconvenience caused by the various and innumerable sizes, shapes, and designations of stoves made by different manufacturers, one is driven to the conclusion that the sooner the whole system is altered and improved upon, the better for all concerned. We have, I venture to say, no two stoves made by different makers, and let out by us at the same annual rental, which are alike as regards price, dimensions, and even convenience. The outcome of this is, that it is very difficult to fix the quarterly rental in a proper and equitable manner. Neither can we, as in the case of meters and other fittings, adopt standard dimensions and outlets to suit each size of stove, which I think is a matter of great importance. The defects I have pointed out will perhaps be sufficient to show that the conditions existing beyond the meter are not what they should be; there being, indeed, ample room for improvement.

We now have to consider in what way these faults can be remedied; and to commence with, I will deal with the internal fitting up of houses, &c., whether it relates to brackets, chandeliers, stoves, or what not. There are several methods which are improvements upon the present system, and which are, in my opinion, essential to the welfare and prosperity of the gas industry generally. In the first place, it should be compulsory for all master plumbers or others undertaking gas-fitting work, to pass a proper examination, showing their competency to execute such work in an efficient manner. Every master plumber or gasfitter should be responsible for defective workmanship, and should obtain a certificate from the gas engineer before being released from such responsibility—such gas engineer, or his deputy, being obliged, by Act of Parliament, to make the necessary inspection. No doubt this is a new departure, and one which would entail extra expenditure; but I believe that it is one which would well repay the gas company, by reason of the satisfaction given to consumers in their more efficient use of gas.

Another improvement which I would advocate is the systematic inspection of all pipes, fittings, stoves, gas-engines and burners, by the gas authorities, in order to ascertain the condition thereof, and when necessary, to advise the consumer as to repairs or renewals. Should it be found necessary after this inspection to overhaul the fittings, &c., the gas authority would find it to their best interest to undertake this class of work, as by doing so, they would have personal and intimate knowledge of the manner in which consumers were using the gas, whether economically or otherwise, or whether the supply was sufficient for the purposes of the consumer. I have, of course, in my mind the necessity of charging for such work as this; but I am strongly of opinion that there should be only a very moderate profit made upon the work done or materials supplied.

I have very little doubt that if every gas company or corporation undertook the sale and fixing of all articles required in the use of gas, which are recognized as being of a reliable and useful nature, not only would their revenue increase, but I venture to say that the results would exceed expectation. Therefore, why should those gas authorities who have not already adopted this system (and there are many), delay in doing so, when a good dividend or income lies at their door? Perhaps one reason is that many managers are too much controlled by their executive in these matters; but at the same time, a manager's duties are to advise that executive as to ways and means, and he should leave no stone unturned until his advice (if legitimate) be taken.

In addition to the sale of goods, the question of hire and hire-purchase may with advantage be considered. The system of hiring and hire-purchase of gas cookers, heating stoves, and fittings, should be put into practice. Up to

the present, the usual method has been to simply hire out stoves, &c.; too little consideration having been given to hire-purchase. There are instances of cases where hire-purchase is practised, but these are the exceptions, rather than the rule.

Each of these systems I have advocated would increase the demand for gas, and add another step towards the success of the undertakings in which we are all so much interested. I will now conclude with a brief summary of the points raised in this paper. They may be classed as follows:—

1. Only certified master plumbers or gas-fitters to be authorized to do gas-fitting work.
2. The periodical inspection of all gas-fittings by the gas authorities.
3. The standardizing of cooking-stoves.
4. The general adoption by gas companies of the sale and fitting of gas engines, stoves, &c., and the hire and hire purchase of cookers, and other eligible gas appliances; also the hire-purchase of gas-fires.

It should not be concluded that these suggestions will entail unnecessary expense, and therefore should be shunned on the assumption that the "game is not worth the candle." We shall have a more uphill fight in the future than in the past to hold our position; and it therefore behoves us to use every practicable means in our power to further this object. I am sure if what I suggest were to be carried out, gas undertakings would reap a considerable reward, and secure the goodwill of their clients, which is certainly a "consummation devoutly to be wished."

The Gas Question in Paris.—This matter was alluded to in the "Journal des Débats" last Wednesday. On the previous day the subject was again brought up in the Municipal Council; a member proposing that an arrangement should be made with the Gas Company whereby the charge for gas might be reduced without waiting for the expiration of the concession. Nothing, however, came of it. The majority merely passed a rather vague resolution inviting the Prefect to settle with the Company "the details of the conditions according to which the city should be supplied." This amounts to nothing; so that the Parisian will continue to pay twice as much for gas as inhabitants of other European capitals. But the Municipal Council will have made a show of doing something; and this is all it wished to do.

Utilization of the Natural Gas at Heathfield.—The natural gas discovered about three years ago at Heathfield Station, and described by Mr. C. Dawson, F.G.S., to the Geological Society last year, is now being utilized to light the station, with the aid of Welsbach burners. On Saturday, the 24th ult., the Tunbridge Wells and Eastbourne Natural History Societies, and a numerous company, visited the station, when Mr. Dawson gave some particulars as to the find, and said he believed the lighting of the station was the first practical application of natural gas in England. Ever since the discovery, the strong pressure at which the gas issued from the ground has been continuous. The effect of the gas with various burners was shown in the engine-room of the pumping-station; those on the Denayrouze system giving an extremely brilliant light. A small balloon was filled with the gas, and, on being liberated, rose rapidly, and travelled at a great pace. The gas is lighter than that made from coal.

The North of England Gas Managers' Association and Workmen's Insurance.—Our readers are aware that the Committee of the above-named Association have taken up the subject of workmen's insurance, with the result that, by a combination of Gas Companies and Local Authorities in the district covered by the Association, insurance up to about £125,000 in wages was effected last year at the rate of 9s. 6d. per cent. net. The matter, it will be remembered, came before the members at their meeting in April, when the Honorary Secretary (Mr. J. H. Penney) reported upon certain negotiations which had taken place with the Insurance Company with the view of obtaining a reduction of this figure. He has had a further interview with the representative of the Company; and the result has been that they have consented to reduce their rate for the ensuing twelve months to the very low figure of 5s. per cent. This substantial concession has not been obtained at any sacrifice of the security; the stability and strong financial position of the Company being beyond question. As the Association have been met in this fair and friendly way, Mr. Penney thinks the fact should be recognized in an endeavour to secure for the Company as large an influx of business as possible through Gas Companies and Local Authorities owning gas-works. He is making known, by a circular addressed to the parties immediately concerned, the result he has achieved; and possibly copies may be sent to other gas companies. In any event, he will be pleased to supply them on application being sent to him at the Gas Offices, South Shields.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 63.)

THE Stock Exchange had a very quiet time last week so far as fresh business was concerned, it being account week, and the house moreover being closed on Saturday. But although prices were on this account not strongly supported, yet the tendency was distinctly more favourable. The oppressive uneasiness proceeding from the position of affairs in France and in the Transvaal had given way to calmer views, and things generally became firmer. Somewhat oddly, the gilt-edged group were the flattest. Consols, which changed hands at 108 on Monday, were done repeatedly at 107¼ on Friday. Corporation stocks, too, were knocked down by the cheap figure fixed by the London County Council for their new issue. The Money Market went through its usual phases at the close of a half year, a sharp temporary demand to be followed this week by pronounced relaxation of the stress. The Gas Market had as quiet a week as it has had for some time past; business being of the most moderate proportions. There was not enough to afford any indication of a general tendency. Variations in price are few; and the ups and downs are pretty evenly balanced. The engrossing event of the week—viz., the rejection by the Lords of The Gaslight and Coke Company's further capital Bill—came too late on Friday to move the market. But weakness had already affected the Company's issues; and the ordinary, maximum, and preference had each receded a point. South Metropolitan was quiet and without any show of strength, opening and closing at 135. Commercial, however, was strong; and the old stock gained a couple of points. A few transactions only were marked in the Suburban and Provincial group without change. Tottenham and Edmonton reconstructed stocks have come back into quotation; and Sheffields, though not marked officially, appear entitled to a higher quotation. The Continental Companies shared the general torpor; and their figures stood unchanged. Among the remoter undertakings, Ottoman had a further advance. Business in the Water Companies was extremely limited; and no changes of quotation occurred except those referable to *ex-div.* corrections. These, however, almost without exception, are favourable to the undertakings; fractional adjustments wherever involved being on their side.

The daily operations may be briefly summed up. On Monday and Tuesday, there was very quiet business without any change in quotations. On Wednesday, the only move was an advance of ¼ in Ottoman. On Thursday, there was a shade more activity in Gaslights; all three stocks receding 1. On Friday, the only feature was an advance of 2 in Commercial old; and on Saturday, the Exchange was shut.

ELECTRIC LIGHTING MEMORANDA.

The City of London Electric Lighting Company on their Defence—The Legal Question—A Fallacious Manchester Water-Power Scheme.

THE City of London Electric Lighting Company are not in the least disposed to take their punishment "lying down." It is possible that their pluck in this regard will win them more respect from the men of the City, who are of a fighting race, than they have hitherto enjoyed as a business firm. The Directors of the Company have circulated among the shareholders a statement relating to the general position. The Board of Trade, having decided to grant a Provisional Order to the Charing Cross Company, naturally incur the condemnation of the Directors of the City of London Company. Nothing will be spared in opposing the confirmation of this Order by Parliament. This is matter of course; but there is not much hope that Parliament in its present mood will accede to the wishes of a monopolist Company. The Directors state, for the information of the shareholders, that "it is the almost invariable practice of the Board of Trade to refuse an Order if the local authority objects; and it is practically certain that they would not have granted an Order in the present instance if the Corporation of the City of London had opposed. The Corporation did not oppose, and have therefore broken their contract whereby they bound themselves, so far as they were able, to give this Company the exclusive right of private lighting for twenty-one years." This is a very plausible way of putting the case; but it will not satisfy anybody. It will be remembered that Sir Courtenay Boyle, in his report on the City lighting, was careful to base his opinion upon general principles. These are not touched by the statement of the Directors of the City of London Company, who apparently intend to rely upon the much-discussed contracts, the validity of which has been impugned.

Sir Courtenay Boyle made short work of the contracts in question, which he declined to recognize as conferring any monopoly of private lighting upon the City Company. Inasmuch as the Corporation, who made these contracts through the Commissioners of Sewers, did not possess such a right themselves, it is difficult to see how they could have given it away. As a matter of fact, all that the Corporation contracted to do was to grant exclusive rights of private lighting "so far as they were able to do so." The Directors of the City Company

argue that this engagement bound the Corporation to "actively oppose" the grant of an Order to any other Company. It is admitted by the Board of Trade that the Corporation were unable to consent to any of the competing applications, having regard to these same agreements. What constitutes the difference between the withholding of consent by a local authority and the active opposition of such an authority to the grant of an Order, it would be hard to define. So far as the Board of Trade are concerned, there is no difference. The matter can only come from the Board in the form of an application to dispense with the consent of the local authority, as provided in section 1 of the Electric Lighting Act, 1888. This was precisely the form in which the question came before Sir Courtenay Boyle, who advised that the consent of the local authority should be dispensed with in the case of the application of the Charing Cross Company, on the ground that the terms offered by this Company were the best available in the circumstances. The latest phase of the legal question is that the City of London Company have commenced proceedings in the Chancery Division against the Corporation for a declaration that the electric lighting agreements are valid and existing. The ordinary course would have been for the Corporation to have taken steps to annul the contracts; but what they have done is to empower their Streets Committee to defend the action "unless the Company are prepared to make such terms as regards efficiency and cost as would confer greater benefits on the consumers and ratepayers, and thereby enable any invalidity of such contracts to be removed, if necessary, by a fresh agreement." We quote from "The Times" report of the meeting of the Court of Common Council last Thursday. This decision of the Court does not strike one as either dignified or just. If the agreements are null and void, they are so in virtue of a law passed in the interest of public policy; and the consequence is sufficiently obvious. The suggestion of bargaining over the legal aspect of the case is not a pleasant one. The straightforward course would have been for the Corporation to have taken the necessary steps to rid themselves of an engagement which was regarded as wrongfully made, and so have resumed their liberty to make any others that might appear expedient in the circumstances.

An admirable report upon a project for utilizing the wasted water power of the Manchester Corporation reservoirs at Longdendale for the generation of electricity to be distributed in the city, has been made to the Corporation by Dr. A. B. W. Kennedy. It is extremely refreshing to meet with so strong a specimen of engineering criticism as we have in this masterly disquisition upon a proposal which belongs to an order of suggestions eminently calculated to engage popular favour. Time and again one sees in the newspapers, and hears from lecture platforms, lamentations over the waste of "natural forces" in this country. Amateurs of engineering are always clamouring for the "utilization"—blessed word!—of water power, or tidal power, or the heat of the sun, or the weight of the rainfall, which according to their fancy ought to be put to work somehow. The Longdendale project had a certain flavour of obviousness which captivated the non-engineering intelligence of those who had seen the big flow of compensation water running down the valley. Why not make this idle stream do something useful before letting it go to the millowners lower down the valley? Dr. Kennedy handles the suggestion with almost exaggerated respect; but the moment he begins to state the facts, it transpires that there is nothing in it. Water-works for the supply of towns are not hydraulic power generating stations. It is open to anybody to argue that the two purposes might be combined. Possibly, in some instances; but, as a matter of fact, it has never been done. At Longdendale, as in connection with the Vyrnwy supply to Liverpool, there is undoubtedly a complete disregard of the value of the kinetic force of falling water; but this is unavoidable. Apart from the consideration of the paramount claims of the water consumers, however, the available hydraulic power of the Longdendale waste water is small. It is valued by Dr. Kennedy at from 300 to 420 kilowatts delivered in Manchester—less than 500-horse power. When it is understood from the report what the necessary works for securing this result would cost, the veriest tyro must agree that the "utilization" of the hydraulic power of Longdendale is chimerical. The way in which Dr. Kennedy has given the Manchester public this demonstration of the fallacy of the idea suggested to him, is most valuable as a contribution towards the prevention of possible future imposture on the same lines. We have in this country no Niagara, nor even a Rhone; but so long as our coal holds out, natural hydraulic power will not be wanted.

Award of the Prize for the Essay on Sulphate of Ammonia.—The circumstances under which the Sulphate of Ammonia Committee, of which Mr. W. G. Blagden is Chairman, offered, about this time last year, a prize of 500 guineas for the best essay on "The Utility of Sulphate of Ammonia in Agriculture," will be in the recollection of our readers. There were 73 essays sent in; and the Judges—Mr. J. Bowen-Jones, of Shrewsbury, and Dr. J. A. Voelcker, of London—have awarded the prize to Mr. James Muir, M.R.A.C., formerly Professor at the Royal Agricultural College, Cirencester, subsequently at the Yorkshire College, Leeds, and at present Instructor in Agriculture to the Somerset County Council.

MUTUAL SCHEMES UNDER THE COMPENSATION ACT.

We have already expressed satisfaction at the reference made by Mr. Stewart, in his address to The Gas Institute, to the fact that much of the alarm originally felt by many employers at the possible burden imposed upon them by the Workmen's Compensation Act has proved—as we have always contended it would prove—to have been unfounded; and we are glad to think that the "bogey" which not a few managers constructed out of the provisions of the measure, by the liberal use of a vivid imagination, is gradually fading from their vision. Believing this to be the case, we feel the present to be a favourable occasion to urge upon gas managers generally the advantages of meeting the obligations of the Act by adopting a certified mutual scheme (in accordance with section 3), instead of continuing to pay the rates which, taking advantage of the semi-panic caused by the passing of the Act, the Insurance Companies have imposed upon employers. We purposely do not speak of "contracting out," because such agreements between masters and men as are permitted under the section named are only in the nature of alternative methods of securing to the men the benefits, or the equivalent of the benefits, of the Act, and do not in any way relieve the employer of his obligations. Moreover the phrase recalls the controversy which wrecked the measure introduced by Mr. Asquith, and which, although quite irrelevant to the provisions of the existing Act, might, if it were by any means revived, render it more difficult to secure the adoption by the men of a mutual scheme.

We are provided with a further reason, if any be needed, for referring to the subject afresh, in the existence of a "new fact"—to borrow a phrase from the French Courts. The Act provides, as we need perhaps scarcely remind our readers, that any scheme proposed to be substituted for its provisions must be certified by the Registrar of Friendly Societies before it can be of effect. The "new fact" to which we refer is the publication, since the Act came into operation (which was just a twelvemonth ago last Saturday), of a book by the Registrar himself ("Provident Societies, &c.," by E. W. Brabrook, C.B.), in which he devotes a chapter to this question of mutual schemes under the Compensation Act, and expounds his view of the duties imposed upon him with respect thereto. We do not think that many of those managers who have insured their undertakings against the liabilities imposed by the Act are aware of the very broad interpretation which is put upon the section in point by the Registrar, and which the statute was obviously intended to bear by those responsible for its framing. The essential wording of section 3 is as follows:—

> If the Registrar of Friendly Societies, after taking steps to ascertain the views of the employer and workmen, certifies that any scheme of compensation, benefit, or insurance for the workmen of an employer in any employment, whether or not such scheme includes other employers and their workmen, is on the whole not less favourable to the general body of workmen and their dependents than the provisions of this Act, the employer may, until the certificate is revoked, contract with any of those workmen that the provisions of the scheme shall be substituted for the provisions of this Act.

This, Mr. Brabrook explains in his book (p. 124), means that the employer and his men may mutually agree to substitute for the benefits set out in the schedules to the Act, other benefits, "as, for example, a general system of life assurance for the assurance against death by accident, a general system of sick pay for provision against disablement by accident, or a system of pensions or of medical relief for the benefits of the Act generally. In such case, it has to be shown that the benefits provided out of the employer's contribution are equivalent to those of the Act, and that the workmen's contribution is not more than is necessary to provide the other benefits." He further states (p. 128) that "the discretion left to the Registrar is so absolute and so uncontrolled that it would be open to him to take any surrounding circumstances into consideration; but it will probably be wise for him in general to restrict himself to the question of actual financial equivalents." What does this mean? Nothing more nor less than that, if an employer have already adopted a system of pensioning his men when past work, or of contributing to their maintenance when sick or disabled, or of doing both, then, if he choose to merge previously existing arrangements into a general scheme under the Compensation Act, acceptable to the men and satisfactory to the Registrar, the additional burden imposed upon him by the Act is reduced to merely the difference, if any, between the estimated cost of its scheduled benefits and the cost which the existing arrangements were to him prior to the passing of the Act. In other words, the Act need not, and was not designed to, impose onerous obligations upon good employers in addition to all that they had previously been doing, of their own free will and wise policy, for the benefit of their men. It merely fixed the standard; and no employer is obliged to do more than, if necessary, level his system up to it.

The first argument, then, in favour of a mutual scheme is that, by any other arrangement, a just employer, unless he be prepared to take the very serious and probably disastrous step of withdrawing all support previously given to schemes instituted for the benefit of his men, will be paying more than the Legislature ever intended him to pay. This argument surely needs no pressing. A further important consideration is that the existence of such a friendly arrangement is eminently calculated

to promote amicable relations between employers and employed; the provision of compensation being automatic—a matter of course, not of contention—all the friction, not to speak of the expense, of litigation is avoided. Nothing is more fruitful of bad blood than constant litigation over trivial amounts. The master perhaps is only anxious to avoid prejudicing himself by admitting a small but doubtful claim, whereas the men take it as a manifestation of a hostile or mean spirit; and bad blood, we need scarcely add, is as productive of mischief in the members of a company as in those of the human body. We have recently emphasized the value of Works' Benefit Societies in promoting good feeling between masters and men; and where such Societies already exist, they will generally provide a convenient basis for a scheme of compensation. Where no such Society has been instituted, the introduction of a mutual scheme under the Act would provide a good opportunity for creating such a bond between the men and their employment. The mutual-scheme plan of meeting the liabilities of the Act further possesses the only advantage that can be claimed for that of insurance—namely, that of fixing the annual liability of the employer, instead of the liability remaining an uncertain amount, which may be for one year a practically negligible, for another year an almost ruinous, figure.

As against the plan of effecting insurance against the liabilities for compensation by means of a third party, we would also urge that, not only is it desirable that the revenue of a company should be divided between the workmen, the staff, and the shareholders, and should not, if there be an alternative, go to swell the profits of insurance offices (who always take care to be on the safe side), but, further, that it is most undesirable that a Company should hand over their injured workmen to an outside party, over whom they have little or no control, and who, by the constant and vexatious contesting of claims might bring the Company into unmerited bad odour with their men. We hope that an increasing number of undertakings will be found imitating the example of the South Metropolitan Company (who instituted a scheme before the Act came into force) as we are assured that they will, thereby, find their profit in the increased loyalty and goodwill of their men, even if they do not save in obvious pounds, shillings, and pence.

A FRENCH TREATISE ON COAL GAS.

Although the physical processes by which ordinary coal is converted into gas are at the present time the same as they were in the early days of the gas industry, it is the merest truism to say that great changes have taken place in the appliances by which these processes are carried into effect. Glancing over the past decade only, one sees, for example, that important improvements have been made in the equipment and management of the retort-house. The extended use of machinery for dealing with the raw material and the solid residual product of its distillation has superseded the brute force which was at one time the only means available for handling them; while the adoption of the automatic retort has further lightened the labour and reduced the expense of stoking. A compact little water-gas plant forms a useful stand-by to the manager in case of emergency or as a permanent auxiliary in gas making. Outside the works, the finished product, although still mainly employed for its illuminating property, is much more largely used for its heating power now than it was even ten years ago. In view of these changes, it is only in the natural course of things that manuals dealing with the gas industry—and, indeed, with any other—should be carefully revised at periods not too far removed from each other, and the contents brought as nearly abreast of the times as the exigencies of the press will allow. If such revision is called for in the short space of time we are now considering, it must be far more necessary in the case of a longer period. It was probably a conviction that the "Manual of Lighting and Heating by Gas" which was published by M. Mulo in Paris in 1869 ought to be submitted to the process above alluded to, if it was to justify its title, that led to this task being undertaken. The gentleman selected for the purpose was M. Bancelin, formerly a scholar at the Polytechnic School in Paris, and at one time an officer in the works of the Paris Gas Company. He has corrected, enlarged, and entirely recast the original work; and the result of his labours has lately appeared in two volumes, forming part of the Encyclopédie-Roret issued from the above-named publishing house.* They are small in size (6 in. by 3¾ in.), and consist of 536 and 446 pages respectively; the text being illustrated by 322 diagrams.

M. Bancelin explains in his preface that he has excluded from the work all descriptions of appliances which have gone out of use, and therefore have only an historical interest, in order to make way for new matter. This was a very judicious excision. Why overburden a book with descriptions of plant which has become obsolete? A few pages suffice to give the reader an outline of the invention and development of gas in France, England, and Germany; and then the author takes up the study of coals and the routine of a gas-works. In connection with the classification of coals, a useful table drawn up by M. Regnault, giving the actual composition of the combustible as shown by direct analysis, and its composition when the ash has been deducted, is reproduced. The analysis of coals is next treated; and then the author comes to the products obtained in the manufacture of gas. He shows how gas is analyzed, and discusses the causes of its light-giving power. Coming back to raw material, he devotes the next 200 pages of his book to retorts, retort-settings, generator furnaces, stoking machinery, heating by tar, and pyrometry; but we do not see any mention of the De Brouwer and other systems for the conveyance of materials. This portion of the text is illustrated by no fewer than 79 diagrams. The subject of condensation is afterwards treated; and then some observations are offered on the various types of exhausters. The next chapter is on purification—materials being first dealt with, then appliances and their constituent parts, and finally their manipulation and the treatment of the spent material. A short chapter follows on station meters; and the rest of the first volume is occupied with the subject of the construction of tanks and gasholders—the concluding pages being devoted to brief descriptions of the Gadd and Mason and Pease systems of guiding.

Having traced the gas to the holder, M. Bancelin gives in his second volume a description of the appliances used in connection with its distribution and consumption. The first chapter is on pressure registers and regulators, governors, anti-fluctuators, &c. This is followed by one on taps and valves, syphons, mains and their location, the attachment of branches, the detection and prevention of leakage, and other matters strictly relating to distribution. We have now reached the consumer's premises, and the author next occupies himself with burners. Having briefly indicated the principle of the bunsen burner, he discusses the theory of combustion, and describes the various kinds of ordinary and high-power burners. M. Bandsept's recuperative system, as embodied in his "Gaso-Multiplex" lamp, is noticed; as are also the Sellon and Clamond burners. A short description of the Welsbach, Denayrouze, and albo-carbon burners closes the chapter. An interesting account follows of consumers' meters; including those of the prepayment class, the mechanism of which is shown by diagrams. Photometry is the next subject considered; the chapter closing with a short account of the pentane standard of Mr. Vernon Harcourt, which the author thinks materially helps forward the adoption of an international standard of light. The succeeding chapter contains a few general details on the construction of gas-works; and then the various materials other than coal employed in the production of gas are considered. Oil is first taken, and Taylor's process described; then we come to mineral oil, heavy gas oil, tar, water, acetylene, wood, and peat. More than a dozen pages and six illustrations (one showing an arrangement of Lowe plant) are devoted to water gas. The physical and chemical properties, dangers, mode of preparation, and net cost of acetylene are concisely set forth; the production of gas from wood, peat, and Boghead is dealt with; and this chapter ends with some observations on the carburation of gas. The next three chapters are on the subject of coke and the machinery for breaking and preparing it for the consumer, the treatment of ammoniacal liquor, and the distillation of tar; illustrations of the apparatus being given. The final chapters deal with the use of gas for cooking, heating, and the production of motive power. This closes the subject-matter proper of the book; but it is followed by a number of useful memoranda for gas engineers and managers, collected and arranged by M. Magnier.

The foregoing is simply an indication of the scope of the book; the accuracy of the contents being only ascertainable in actual use. It will be gathered therefrom, however, that an endeavour has been made to bring the work up to date. As the two volumes under notice are part of a collection of manuals constituting an encyclopædia of arts and sciences, they had necessarily to conform to the rest in size and style. Otherwise, although agreeing with the aphorism of a certain classical scholar, now gone to his rest, that "a great book is frequently a great evil," we think the pages might with advantage have been a little larger, and the books would have gained in dignity by having stiff instead of only paper covers. However, these are but details; and it must be acknowledged that both text and illustrations are very clearly printed.

* "Nouveau Manuel Complet de l'Eclairage et du Chauffage au Gaz. Traité Elémentaire et Pratique. Suivi de l'Aide-Mémoire de l'Ingénieur-Gazier, par M. Magnier." Nouvelle édition, corrigée, augmentée et entièrement refondue. Par E. Bancelin. Paris: L. Mulo; 1899.

THE REVIVAL OF APPRENTICESHIP.

An important, but hitherto hardly noticed aspect of the municipal employment of labour appears in connection with a report to the Technical Education Board of the London County Council on the Building Trades. The special object of the inquiry which formed the basis of the report was to obtain evidence and make suggestions regarding the existing facilities for enabling artisans in the building trades to obtain a good technical instruction in their handicraft. It is a familiar complaint on all hands that good craftsmen are growing scarcer every day; while those who are available are so "independent" that a foreman dare not speak to them. It is not that the wages offered are insufficient to attract men; on the contrary, the pay is only too good, inasmuch as the habitual losing of "quarters" is no privation. On the other hand, the whole of the gigantic

School Board system of London and the large towns appears to be an agency for the manufacture of inferior clerks; the most promising lads being kept at school just long enough to acquire a distaste for manual labour. The most obvious explanation of the lack of competent handicraftsmen, outside the last suggestion, is afforded by the general abandonment, in recent times, of the apprenticeship system. This fact of the existing situation appears to be granted on all hands. But, as is not unusual, when one begins to inquire the reason for the fact, the response is not quite what might have been expected. Employers of labour all deplore the decline of the apprenticeship system, with the consequent scarcity of thoroughly trained artisans. But the first delinquents in this regard are the employers themselves, especially in large centres of industry. Of late years, the owners of the largest shops have been averse to taking apprentices, on the ground that the boys did not pay. The policy thus initiated by the masters was picked up by the Trade Unions, especially of the trades in which the apprentices did pay, with the result that the system of apprenticeship was worn away at both ends.

The reason given by the employers in the building trades for objecting to apprentices is that, in London especially, the very large establishment expenses connected with a builder's workshop render it imperative that every bench and working room in the place should be most productively employed. Therefore none but the very best men can be allowed to work in the shops. Furthermore, in London and the largest towns, the tendency is for the large builder to become a general contractor. His establishment is one of many branches, every one of which must be of the highest efficiency if he is to keep his business going. He cannot afford the trouble and loss of having hands in training—perhaps for somebody else to employ at a full profit. Working always at the highest pressure, the town master builder cannot find room for any but the best workmen he can get. Consequently, the town employer recruits his people from the country, where the desire to learn a trade still persists. Country shops still take apprentices; but when the full-fledged workmen emerges from the chrysalis, or "improver" stage, if he has anything in him he flies to London or some other centre.

This course of procedure is not self-sustaining. By degrees the old-fashioned country shops, where a young man can learn all that goes to the making of a thorough tradesman, are vanishing. The country employers cannot compete for the big country jobs with the omnivorous town contractor, who has machinery and everything else convenient for doing work cheaply. Who is going to train workmen for the big contractors, who expect to find men to their hand, ready made? Wages will not evoke men. And now that the general contractor is, in his turn, being supplanted by the municipal department, whither is the apprentice to betake himself? This is the question. Nobody wants to train learners of trades, except in some where the learner, while he is becoming expert, is still a source of profit to his employer. But in the latter case the Trade Union steps in; because the full-rate man naturally objects to the unlimited competition of youngsters who are almost as expert as himself, while receiving learners' pay. The Trade Unions will not have boys' workshops if they can help it.

The exigencies of modern industrial life, as realized in competitive trading, put a heavy premium on maximum efficiency. Thus for twenty of the best years of his life the workman is in high request. But the workman is not only a producer, he is also, and first and last, a man; and the employer does not want either the beginning or the ending of his working lifetime. If the ideal of municipal employment is to be that of setting a good example to other employers, the revival of the apprenticeship system, or something like it, must be one of its developments, and old-age pensions another. The inducement of profit-sharing is forbidden to municipal workers; but good industrial training to begin with, fair play to go on with, and ample provision for declining years to end with, constitute a fair equivalent for the other prizes of industry. The municipal employer must evidently be prepared with a different labour policy from that of the individual employer, supposing, for the sake of argument, that the latter is bound by economical considerations to the rule of favouring maximum efficiency.

Hitherto, nothing proposed as an alternative to apprenticeship has proved satisfactory. Immense sums of money are spent upon polytechnic and other classes for imparting so-called technical education to working lads, with little or no tangible result. This is partly because the survival of the old idea that schooling should enable a youth to improve himself—meaning to fit himself for some other and, in popular acceptation, superior employment. The British pedagogic mind has hardly yet grasped the notion that a young joiner or gas-fitter may need help, not to get out of his occupation, but to perfect himself in the practice of it. There is a theoretical side to all handicrafts, which ought to be competent to supply the inquiring mind with the why and the wherefore of all the tricks and dodges, the "rules-of-thumb," and so forth, which a lad may pick up in the workshop. But a trade can only be learnt by really working at it. Meanwhile, the smallest amount of sound theoretical instruction ought to be worth acquiring, for the sake of the quickened intelligence which usually results from it. One must not expect a polytechnic class to produce a good gas-fitter, able to earn his money; but one would look for a quicker perception of what is wanted to make a good job on the part of a man who had attended a class.

In any revival of the apprenticeship system, those who undertake the work should bear in mind that in the old order there were many stupidities, and there was also much waste of time. Lads were put to do the drudgery which machines do much better nowadays; and they had a great deal of "fagging" to perform which might well be dispensed with. Taking all things into consideration, the responsible head of a great municipal workshop, such as the gas-works or the water-works, should be glad to get his young hands direct from school, and train them according to his own rules. There might be a system of trade scholarships (to use an inappropriate jumble of words for the sake of clearness of meaning), open to deserving boys from the local elementary schools, and tenable first at the polytechnic and afterwards at the municipal works. It would not be at all impossible for a gas company of importance to follow the same system. Employment subsequently in the same service need not be a *sine quâ non*. Putting a good, honest trade in a lad's hands would be sufficient recompense in most cases; for, whatever else may be true of human progress, it is certainly as true as ever that "By hammer and hand, All arts do stand."

We need not go for the present into the vexatious question of the tendency of Trade Unions to degrade handicrafts to the level of the least efficient workers, which discourages young men from trying to do their best. The real purpose of this brief essay upon a great subject is to throw out the hint that a new combination of elementary school, technical class, and workshop training might possibly be inaugurated at suitable places where the idea of Municipalism flourishes in action.

INTENSIFIED GAS LIGHTING WITHOUT WATER-POWER.

In the "Journal" for May 23 (p. 1363) there was described an interesting method of working the Somzée-Greyson intensified gaslight by the aid of Mr. J. Keith's water-motor. It seemed at the time that the force of simplicity could no farther go in this direction; and we are far from saying that this application of water power to increase the pressure of gas at the point of ignition, as required in the "intensified" system of incandescent lighting, has been superseded. Yet it is scarcely necessary to point out that a constant supply of water is not an invariable accompaniment of a gas service. There is also a natural suggestion that a gas supply, whether intended for intensified lighting or otherwise, ought to be self-sufficing. At any rate, Mr. Keith has perceived sufficient reason for supplementing his water-pressure system, already described, with a means of attaining the same end without the adventitious aid of water. Accordingly, there is to be seen in operation at the establishment in Farringdon Avenue, an altogether new method of increasing gas pressures by means of hot-air power. Due consideration of patent rights precludes, for the present, the complete publication of the details of the new improvement; but the results can be briefly stated. Going to the scene of the experiment one morning last week, without notice, we found the hot-air plant connected up to the same lamps as the water-power arrangement previously described. The Somzée-Greyson gas-burners were lit on the instant, and burnt for the time at the ordinary street pressure. Meanwhile an atmospheric burner was lighted, and put under a Robinson hot-air engine, which was connected with a pair of Keith's water-slide gas compressors and governors. In a few minutes, while the general nature and disposition of the little plant was being inspected, the warm air began to drive the motor; and the necessary pressure to start the intensified lighting was established. A hot-air engine which could be covered by a hat, and was driven when once started by a gas-flame consuming about 2½ cubic feet per hour, did all the work. The gas-pressure arrangements are completely self-regulating, insomuch that it does not make any difference whether the gas-burners, or any of them, are alight or not. The hot-air engine works continuously, of course; and there is a complete absence of any gearing beyond the band connecting its fly-wheel to the compressor pulley. The size of apparatus shown is capable of serving from 30 to 50 burners; and the only extra expense of the system is the small supply of heating gas. When once started, these hot-air engines will run for a considerable time without any gas at all. It is quite marvellous that they are not already more generally used for small powers.

Of course, the same system is capable of being adapted to any scale of intensified gas lighting, from the half-dozen lamps outside a public house to the requirements of a railway goods yard. Moreover, for increasing the pressure of gas in the mains of a low-lying district, the arrangement is admirable, and would only require the visit of an oiler and cleaner once a day. Now that hot-air power, provided by a gas-flame, has been adapted to this purpose, the only untried source of energy suitable for the same application is electricity. One can imagine the mingled feelings with which the usual offer of an electric light company to supply current for power at one-half the ordinary lighting rate would be complied with for such a purpose! Electricity at 2d. per unit would be a very cheap and satisfactory means of working a Somzée-Greyson installation of the largest size.

It is very evident, as we remarked on the previous occasion, when discussing the possibilities of these and other facilities for heightening gas pressures in street mains and services, that the

conditions of districting are radically changed thereby. Hitherto all the problems of efficient districting have had to do with the modifying of an originally high pressure, whether this pressure came straight from the gasholders into the trunk mains, or was the result of rising ground. In future, the practicability of increasing pressure locally will also be taken into consideration. In the South Metropolitan district, the first actual problem of this character was solved by the employment of a Sturtevant blower. This, however, is working on the large scale, and the need does not present itself in so exigent a shape to many gas managers. To heighten the pressure in a 6-inch or 9-inch district main is more like the common requirement; and this is very feasible by the aid of a service gasholder with a capacity equal to a single minute's consumption. Quite a fresh chapter in the history of the distribution of gas is opened up by this improvement.

For factories and forges using gas for metal working, high pressure is of as much consequence as ample supply. Many gas undertakings have been deterred from encouraging this branch of consumption by reason of the extra arrangements necessary to make it effective. Assisted pressure removes the difficulty. Again, it would not be surprising if the same agency were pressed into the old enterprise of making street lamps light and extinguish themselves automatically. The electricians used to gibe at gas engineers for being unprogressive in their methods; at the present rate of mechanical improvement of gas light systems, the same critics will soon begin to complain that gas is going ahead too fast for them.

Though Mr. Keith, Mr. Sugg, and others are busily following up an opening which is sure to lead to a large business, the extension of intensified gas lighting in public places and those private commercial establishments for which it is so admirably adapted, is going on but slowly. There is nothing to be sorry for in this, when it is remembered how many brilliant failures in this line have been recorded of late years. The great thing is not to have a number of experiments on trial; but to keep the lights in when once started. The very fertility of modern invention in this branch is liable to alarm possible patrons, who may not unreasonably elect to wait and see what fresh improvement time has to reveal. It is sufficient to know, however, that by the new systems of high-power lighting, gas has shot ahead of its only possible rival, the electric arc. This is a positive achievement which will stand upon impregnable economic grounds; and the question of which is the absolutely preferable system to select for use in particular cases, is a secondary one. What gas managers desire, with a view to recommending in their own localities, is no experimental success; but a good, working arrangement, warranted to stand wear and tear, and work with the smallest amount of extra attention. At the same time, they know very well that it is impossible to get something for nothing; and that improvement of gas lighting, as in everything else, has to be paid for. Hence the question of acceptability is one of degree, and the degree needs exact valuation. It is scarcely necessary to remind technical readers how slowly and painfully the incandescent gas-burner won its way with the general public. True, there were defects to be borne with; but even if all had gone on swimmingly with the new system from the first, the road to success would have been almost as long and arduous. The intensified gas-light is something standing a little farther along the same road; and it is not within everybody's reach just yet. It is open to be argued that something more durable and stronger, in the shape of the mantle, will have to be put upon the market before the new system of high-power gas-lighting is thoroughly equipped for universal service; but that is another matter. Meanwhile, gas managers everywhere can safely take this assurance that there are means actually available by which they can put the electric arc light in the shade, both physically and commercially.

Changes in the Engineering Staff of the South Metropolitan Gas Company.—The lamented death of Mr. Frank Livesey a short time since has necessitated certain changes in the engineering staff; and these were arranged at last Wednesday's meeting of the Board. Mr. C. C. Carpenter, who, it may be remembered, was not long ago appointed Assistant to the Chief Engineer, succeeds him in this position; Mr. A. F. Browne is transferred from Rotherhithe to Vauxhall; and Mr. Hunter, lately the principal foreman at the latter station, takes the post vacated by Mr. Browne. We learn that in the future more responsibility will be given to the Station Engineers in designing and constructing new works. Other changes, incidental to this re-arrangement of the duties of the engineering staff, have taken place. Mr. Tanner, the Company's trusted and capable chief foreman at the Old Kent Road, having retired on a pension, after twenty-five years' devoted and faithful service, and Mr. Fox, the chief retort-house foreman, having become head foreman, it was necessary to appoint a Superintendent, under Mr. Carpenter, at that station. Mr. Harold Woodall, son of Mr. Corbet Woodall, who has had a temporary engagement with the Company, has been found to possess all the necessary qualifications for the position; and he has received the appointment. On Wednesday last, the Company's workmen testified their regard for Mr. Tanner by presenting him with an illuminated address, two large frames filled with their photographs, and an ornament in silver (see p. 62).

PERSONAL.

Mr. HENRY KITSON, foreman at the Hinckley Gas-Works, has been selected to succeed Mr. A. Drage as Manager of the East Dereham Gas-Works.

Mr. F. H. CREBER, of Plymouth, has been selected, out of a large number of candidates, to fill the position of Assistant Water-Works Engineer to the Cardiff Corporation.

Mr. CHARLES E. A. ARMITAGE, of Emmanuel College, Cambridge, son of Mr. Charles Armitage, of Lancaster, has obtained the B.A. degree in the Cambridge Natural Science Tripos.

Mr. T. A. SIMPSON, the Manager of the Kettering Water-Works, has been presented by the members of the Water-Works Mutual Benefit Club with a wall barometer, on the occasion of the winding up of the Club by reason of the transference of the undertaking to the District Council.

OBITUARY.

Mr. DAVID MAXWELL, formerly Water Engineer to the Hull Corporation, died last Saturday week. He was born in 1819; and his retirement from active work took place about ten years ago.

Mr. JOHN HALL, J.P., one of the Directors of the Newcastle and Gateshead Gas Company, died on Monday evening last week in his 76th year. On the previous Wednesday, he attended a meeting of the Board, and then proceeded with them on an inspection of the Redheugh works. While there, being somewhat heated, he took off his overcoat and contracted a chill from the cold wind which was blowing over the river valley. After leaving the gas-works, he went to his office, and was there seized with faintness. He was then taken home; but the medical gentlemen who were called in took a serious view of the case, and, though their patient seemed to rally on one or two occasions, it was evident that, owing to his previously-weakened condition, his constitution would prove unequal to the strain.

We regret to record the death, on the 27th ult., after a brief illness, of Mr. HENRY WOLLASTON BLAKE, M.A., F.R.S., one of the Directors of the Continental Union Gas Company and of the Union des Gaz. Mr. Blake was educated at Eton and Trinity College, Cambridge, where he became a scholar and High Wrangler in 1837. He was by profession an engineer, and joined James Watt, of Soho, Birmingham, as partner in 1847. He was a member of the Institution of Civil Engineers (having been admitted on June 24, 1845), of the Institution of Mechanical Engineers, and of the British Association, being occasionally President of the Mechanical Section. He had been for 55 years a Fellow of the Royal Society, and was elected to the Royal Societies Club in 1872. He was also elected in 1843 to the Smeatonian Club of Engineers, and continued a member until his death. He was for 46 years a Director of the Bank of England, and also Director for many years of the London and North-Western, the Great Indian Peninsular, and Indian Midland Railways. He was a Fellow of the Royal Geographical and Astronomical Societies, and always took the keenest interest in their proceedings. For nearly 50 years he had been one of Her Majesty's Lieutenants for the City of London. Deceased was in his 85th year. The funeral took place last Saturday.

NOTES.

The Manufacture of Graphite.

The commercial production of carbon in the form of graphite is becoming a considerable industry. Mr. E. G. Acheson has described the methods of formation and manufacture of this form of carbon, in a paper read before the Franklin Institute of Philadelphia. As plumbago or blacklead, the natural production of graphite for the whole world stands pretty regularly at 57,000 tons yearly. Artificial graphite can be made in several ways, chiefly of laboratory interest. It has been found to occur in the products of the electric furnace, especially in connection with carborundum, when it is regarded as an impurity. Mr. Acheson was engaged in making carborundum when he noticed that, when ordinary bituminous coal coke was used to form the core of the charge, a good deal of it was converted into graphite; while when petroleum coke was used, very little of it became graphitic. Following up this indication, Mr. Acheson established the connection between the power of gas coke to make graphite and the impurities contained in the fuel. Consequently, he proposes to make graphite electrically by heating carbon, in association with one or more oxides, to a temperature sufficiently high to cause the materials to react chemically, continuing the heating until the combined carbon separates in the free state. The process is being worked by electric power at the Niagara Falls, where all sorts of carbon articles are being graphitized. One product is a mixture of pure amorphous carbon and graphite in fine powder, which is made the basis of a so-called carbon paint for iron work. The worst coke makes most graphite. The refuse of coke-ovens is quite good enough for this manufacture.

Realization of the Violle Platinum Standard of Light.

At the second of the annual *soirées* given by the Royal Society, one of the novelties on show was Mr. J. E. Petavel's attempt to realize the Violle platinum standard of light. Nothing has been

heard of this standard for a long time, although it was accepted by two International Congresses. It should be stated that the Violle standard is specified to be the amount of light afforded from a surface of one square centimetre of molten platinum at the point of solidification. Owing to practical difficulties, working photometrists have left this measure of artificial light severely alone; but it appears that a research into the character of the standard, and the possibility of realizing it, has been going on in the Davy-Faraday laboratory of the Royal Institution for the last three years. The authorities of the establishment must have seen something in it, because they have had a photometer constructed for the purpose of working it practically. This consists of a photometer box having at one end the light to be standardized, so disposed that the light rays are reflected upon the screen by a mirror. At the other end is the platinum, in a crucible, kept in the molten state by an oxyhydrogen flame. A mirror over this also directs the rays upon the screen. During the heating process the crucible is kept covered; and at the moment of making the determination the gas is turned off, and the surface exposed. It appears like quicksilver, of most dazzling whiteness. The reflecting mirrors are interchangeable, so as to eliminate any error due to their interposition. It is not stated if the apparatus has been in use long enough to show if error is introduced by any alteration of the platinum during repeated meltings.

Mr. E. Coppee on Bye-Product Coke-Ovens.

At the recent Conference of the Institution of Civil Engineers, Mr. E. Coppée read a short paper on "Bye-Product Coke-Ovens." The author argued that the present activity of the iron trade will be followed by a season of slackness for which it will be prudent to provide by the timely adoption of means for diminishing the cost of production. He gave the results of the working of bye-product coke-ovens, and showed that they make coke at about one-half the net price of bee-hive oven coke. As regards the superiority claimed for the latter by some metallurgists, Mr. Coppée admitted that it may have existed until now in coke made with certain qualities of coal rich in volatile matters and also dry; but he maintained that this superiority has only been true in these special cases, and that by employing the system of heating the coal prior to heating it in the horizontal furnaces, a coke of almost equivalent value to that produced by the bee-hive ovens can be made, even with these special kinds of dry coal. After all is said, bee-hive coke must be worth twice its weight of retort coke to justify itself at the present day. Sir Lowthian Bell discussed the paper at considerable length; describing a long series of experiments he had made by placing coke in tubes and heating it to redness. To the question of what constitutes the difference between a good and a bad coking coal, Sir Lowthian Bell answered that this is one of the secrets which Nature still keeps. Mr. E. P. Martin said he did not believe that the volatile matter governs the coking of coal. Mr. Coppée thinks the best plan of getting good coke is to use a mixture of coals. He admitted that bye-product coke has not the silvery appearance of the best bee-hive coke, but argued that this is not a serious consideration.

Transparency and Opacity.

A new means of investigating some of the properties of artificial light was described by Lord Rayleigh in a recent Royal Institution discourse on Transparency and Opacity. One kind of opacity is due to the absorption of light; but the author dealt chiefly with that deficiency of transparency which is caused by irregular reflections and refractions. One of the best examples is that met with in Christiansen's experiment. Powdered glass, all from one piece and clean, is placed in a bottle with parallel flat sides. In this state it is quite opaque; but if a mixture of bisulphide of carbon and benzol, carefully adjusted to be of the same refractivity as the glass, is poured into the vessel, the mass becomes optically homogeneous and therefore again transparent. In consequence, however, of the different dispersive power of the two substances, the adjustment is good for only one part of the spectrum; other rays being scattered in transmission, much as if no liquid were employed. The consequence is to show a small source of light, when backed by a dark ground, in its perfect natural outline but strongly coloured. The colour depends upon the precise composition of the liquid, and further varies with the temperature; a few degrees of warmth sufficing to cause a transition from red through yellow to green. The materials of a striking lecture experiment are given here. Only recently Lord Rayleigh has discovered that the range of refrangibility of the light transmitted in this way through a stratum of 15 to 20 mm. is very small. Various substances and fluids were employed in these experiments. At the close of the lecture the failure of transparency which arises from the presence of particles, small compared to the wave length of light, was discussed. The tints of the setting sun were imitated by passing the beam of the electric arc through a liquid in which a precipitate of sulphur was slowly forming. The lecturer gave reasons for his opinion that the blue colour of the sky is not wholly, nor even principally, due to particles of foreign matter. The molecules of air themselves are competent to disperse a light not greatly inferior in brightness to that which we receive from the sky.

At the Trade Union Congress to be held next September, co-operative production, the Mines (Eight Hours) Bill, and the universal eight-hour day, will all come up for discussion.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Experience with Hydraulic Mains.

Sir,—Mr. William Carr's admirable paper on "The Evolution of the Hydraulic Main," published in the current number of the "Journal," deserves the highest encomium for the lucid manner in which the subject has been handled. There are, however, one or two points with which Mr. Carr has dealt, where my own experience is not quite in accord with him; and I should like to briefly draw attention to them.

When I took charge of the Vauxhall works some years ago, there were at least as many forms of hydraulic main in use in them as there were retort-houses. It was in the most recently erected of these that the greatest trouble was experienced with "pitched" mains. One or other of the settings was always standing off with the mouthpieces bricked up, and a row of fire-pails under the hydraulic main to facilitate the work of a regular gang of men whose duty it was to clear out the accumulated pitch.

In reading up some back volumes of the British Association of Gas Managers' "Transactions," I came across Mr. Livesey's paper; and his reasoning appealed to me so forcibly, that I at once set to work to fill up the bottoms of the hydraulics, giving a maximum space of 2½ inches under the dips. As the work of conversion proceeded, so our troubles diminished, until eventually it was a very rare occurrence to find anything but thin tar in the mains.

In course of time, it became necessary to alter the settings of sixes and sevens to tens; and as the hydraulic mains were not in a condition good enough to justify their further use, the form and arrangement of new ones had to be determined.

The success attained with the converted mains might have been due to the causes pointed out by Mr. Livesey, or, as affirmed by others, to the interposition of the thick layer of sand cutting off the heat radiated from the top of the settings.

Further experience verified the correctness of Mr. Livesey's conclusions; and I therefore made the new mains to the pattern advocated by him (without, of course, the false bottom), and fixed them within 1 foot—in some cases 9 inches—of the top of the settings. The arrangement has succeeded admirably, and, to my mind, completely justifies the views put forward by Mr. Livesey in his paper, that "*it is the hot gas, and not the radiated heat from the setting, that does the mischief.*"

Mr. Carr, in his paper, attributes the complete success attained to the favourable conditions of the low heats attending a make of 9500 cubic feet per ton. I shall be pleased to show anyone interested a retort-house worked with Livesey hydraulics and high heats giving a make of 10,500 cubic feet per ton, where there is not more than ¼ inch of tar in any of the hydraulic mains, the bottoms of which ring like a drum when the dip-rod is dropped in.

Mr. Carr says that blocking will invariably happen in the ascension-pipes and hydraulic main if the gas passes through at a temperature over 300° Fahr., and that gas must go into the hydraulic main at a temperature not greatly above 200° Fahr. in order to use a water-seal; while it would be desirable if this temperature were not exceeded. In order to test the correctness of this theory, the following experiment was made in the retort-house referred to above:—

Table *giving the Temperature during a Six-Hour Charge in an Arch-Pipe at a Point immediately above the Dip.*

Degrees Fahrenheit.		Time of Observation after Charging Retort.	Degrees Fahrenheit.		Time of Observation after Charging Retort.
A.	B.		A.	B.	
385	361	5 min.	231	..	2½ hours.
..	352	¼ hour.	..	244	2¾ ,,
359	..	½ ,,	206	232	3 ,,
..	332	¾ ,,	188	224	3¼ ,,
338	324	1 ,,	175	..	4 ,,
289	288	1½ hours.	161	202	4½ ,,
261	270	2 ,,	150	186	5 ,,
..	264	2¼ ,,	132	168	5½ ,,
			112	..	5¾ ,,

The suggestion made by Mr. Carr that the gas entering the hydraulic main is hottest towards the end of the charge is, no doubt, a slip of the pen. The contrary is really the case, as indicated above.

July 1, 1899. Charles C. Carpenter.

The Inspection of Fittings by Gas Companies.

Sir,—I have read with interest the paper prepared for the Gas Institute meeting by Mr. F. A. Winstanley, of Rotherham, and regret that an opportunity was not available for discussion on this interesting topic.

The question of the responsibility of a gas company or corporation toward their consumers in taking up the fittings beyond the meter is one which has exercised many minds, particularly as regards escapes and consequent explosions. Take two or three cases in point. The "Journal," in the issue for Jan. 10, 1899, reports a case in which a Mrs. Willis, of Woolwich Road, London, S.E., was suffocated by an escape of gas from a chandelier; and the following words in that report fairly sum up the case: "The sad occurrence was brought about entirely by inattention to the simple duty of replenishing the water-seal of a chandelier—a neglect which is unfortunately so very general." Had the last portion of the chandelier top been filled with oil (olive or any other description), this would have remained on the top of the water and prevented its evaporation.

I turn back to my "Journal" of May 3, 1898, and in "Scotch Notes" find it is stated that a number of gas explosions have occurred in Aberdeen; in one case damage to the amount of £250 being done to the house and injury to an infant child of two years old, which resulted in the amputation of its arm.

Further back again—Nov. 2, 1897—in Queen's Buildings, Southwark Bridge Road, we have another case where a young man, John Ernest Baker (17), and Jessie Herman (26) were severely burned on the face, hands, and body, and a woman named Emma King, 76 years old, was also badly burned on her arms. Pendants had been put up that day.

So common are these accidents that the "Journal" frequently does not report them, as they invariably arise from the same cause. Now, Sir, I ask

whether one explosion of this kind does not do more harm to the gas industry than can be made up by any amount of attention and civility from those in charge of the gas department? "Prevention is better than cure." As water-slide fittings are still in great and growing favour, would it not be advisable to systematically inspect all water-slide pendants and chandeliers, and thus remove one of the most prolific causes of gas explosions known? This might be accomplished without risk of damages in case of accident, by the consumer filling up a form asking the gas department to be good enough to periodically inspect his fittings (free, or at a nominal charge), absolving the gas department from all risk in case explosions occurred.

Further, with reference to the maintenance of outside fittings, I have been much interested in the departures made at Newport, Newmarket, and Aldershot in the maintenance of incandescent burners in private houses by the gas department. At Newport, the charge is 2s. per burner per annum, for inspection and maintenance. I understand that where there are more than half-a-dozen burners in use, this charge covers the cost; but where single burners only are used, a loss is experienced. There is no doubt that the one thing wanted to make the incandescent light more general is some such system of maintenance as this.

An organized and regular system of supervision, so successfully introduced by Mr. Alfred Colson at Leicester, has made the use of gas cooking-stoves there the rule rather than the exception. The same supervision applied to the use of gas for lighting would, I respectfully urge, result in many cases in the rejection of the electric light in favour of the incandescent gas-burner. I have one case in my own experience where a large hotel is at the present time about to discard the electric light, and put up 250 incandescent gas-burners, which we are maintaining, on behalf of the gas company, at a charge of 3s. per burner per annum. This works out to £37 10s. per year, which is less than electric light renewals have cost.

Fresh duties such as these, accompanied by the immense amount of work recently entailed by slot installations, will add to the already heavy work of gas managers. Gas committees and boards of directors are, however, generally willing that extra work should be rewarded by extra pay, and that for every increase in work there should be an increase in staff. The results of preventing many explosions and obtaining the best duties from stoves and fittings, consequent on regular inspection, will more than repay all the expenses entailed.

Mr. F. A. Winstanley's appearance as the writer of a paper for the Gas Institute will be generally welcomed, both for his own sake and that of the name he bears. Many will desire that some adequate advance may be made in the directions he so emphatically indicates.

June 30, 1899. E. W. T. Richmond.

The Reduction of Sunday Labour in Gas-Works.

A correspondent will be glad if some of our readers who have been able to reduce or entirely abolish Sunday labour in their works will give him, through the "Journal," the benefit of their experience of the change, principally in regard to stoking. He is specially desirous of learning what are the effects upon clay retorts subjected to weekly slacking off and firing up again—for example, whether there is any opening or widening of cracks; any loss, and how it is remedied; and what time is necessary to get up the heats. Already steps have been taken in the direction of mitigating the evil of Sunday labour; and the recent considerable extension of the storage capacity at the works with which our correspondent is connected seems to allow of its still further reduction. Any particulars which will be calculated to lead to this result will be gladly received.

New Joint-Stock Company.—The Tayside Electric and Gaslight Company, Limited, has been registered with a capital of £25,000, in £1 shares, to acquire the business of the Newport (Fife) Gas Company, at present in liquidation, and the electric lighting installation at Wormit, in the same district.

Death from Gas Poisoning at Belfast.—Last Wednesday, at Belfast, Mr. E. S. Finnigan held an inquest on the body of Henry Crowe, of Upper Meadow Street, who died the previous morning from gas poisoning. The evidence of one witness—Thomas Crowe—showed that the gas obtained entrance into the house through a loose coupling on the inlet-pipe from the main to the meter; and he believed that the coupling could be loosened by the vibration resulting from heavy traffic on the street. The medical testimony was to the effect that death was caused by carbonic oxide poisoning. The Coroner, in summing up, dwelt on the dangers attendant on the present system of mixing coal and water gas. During the last twelve months, he said, they had had seven deaths from gas poisoning. The danger should be minimized by turning off the meter at night. The Jury returned a verdict in accordance with the medical evidence, attaching blame to no one. We are informed that the published condensed reports of the proceedings at the inquest do not give the whole of the facts; and indeed it is possible (as is frequently the case at such inquiries) that they did not all transpire. In order that the true circumstances may be known, and that our readers may draw their own conclusions, we give the following communication on the subject from a well-informed correspondent: "The deceased was a plumber and gas-fitter. On the night of the fatality, he sat up in his room reading by candle-light after the rest of the inmates of the house had gone to bed. After some time he went downstairs, and was not seen again alive. Fortunately his mother had to knock up her brother, who occupied a room in the house, about two a.m., in order that he might attend the special work at which he was employed; and but for this circumstance in all probability the whole of the inmates would have been asphyxiated. The house at this time was full of gas, and a canary hung in the hall had died. The meter coupling was found unscrewed, and gas escaping in such volume as to be audible to those who went near the room. Undoubtedly the deceased unscrewed the coupling. It is common report in the neighbourhood that, when found, the head of the deceased was actually in the cupboard containing the gas-meter. There can be no doubt that no gas was escaping when the inmates went to bed. Equally there can be no doubt that deceased for some purpose or other went to the box containing the meter and unscrewed the coupling. From these facts, and others which have been ascertained, I think there can be only one inference as to the nature of the 'accident.'"

PARLIAMENTARY INTELLIGENCE.

Gleanings from the Committee Rooms.

The event of the week in the Committee Rooms has been the rejection of the Bill of The Gaslight and Coke Company by the House of Lords Committee, presided over by Lord Brougham. The heaviness of the blow to the Company cannot be over-rated. The costliness of the proceedings, and the fact that the same expense must inevitably be incurred again during the next twelve months, are insignificant considerations when placed against the crippled position upon which, according to the showing of their own witnesses, the Company have been plunged. At the end of this year, it is clearly and emphatically declared, they will be practically stranded for the wherewithal to carry on their business and to meet the necessary and urgent capital expenditure required to cope with the demands made upon them and to enable them to raise their manufacturing operations to the more economical level. The amount of capital asked for in the Bill as it entered the Commons was £3,500,000; but the Committee of that House remorselessly chopped off a round million, and it was for the reduced sum that the promoters approached the House of Lords.

It has been rumoured—rightly or wrongly we are not prepared to say—that some of the Directors had been speculating as to the chances of getting the million restored to them in the House of Lords. In the Lea Bridge case, Lord Camperdown impressed upon those concerned therein the omnipotence of Parliament—that which Parliament hath given, his Lordship said in effect, that can Parliament take away; and that which Parliament hath taken away that can Parliament restore. Even so; and therefore there may be some truth in the rumour that a simple, childlike faith in this great omnipotence led some of the Directors of the Gaslight Company to entertain the wild hope that the million might be recovered. But the attempt to obtain it again would have enhanced the peril in which the measure stood; the opposition would have been enraged and unsparing in the vehemence of their attack; and, after all, if the attempt had been successful, the Bill would have had to be returned to the Lower House, and this would, in all probability, have been fatal. But the discreet ones knew better than to incur any such risk at a time when the administration of the Company is being "weighed in the scales," and stands a fair chance of being "found wanting."

One thing was clearly perceived during the proceedings before the Lords Committee, and that was that everybody is getting heartily sick of hearing and talking about The Gaslight and Coke Company and their doings. Their Lordships soon exhibited a tendency to weariness; and Lord Brougham did his best to repress reiteration. Counsel for the Company exerted themselves at the beginning to show that the Company were more sinned against than sinning; but they appeared to give way during the examination of the witnesses to an almost apathetic disposition. The witnesses, too, looked oppressed; and even Mr. Field, usually so volatile, sunk at times into quite a subdued demeanour—the outcome possibly of his recent violent exercises. An unpleasant inquisitiveness on the part of the noble Chairman as to the likelihood of an early report from the Select Committee who are inquiring into the charges of the London Gas Companies seemed at one stage to foreshadow the "hanging up" of the Bill for a time; and may be this had a damping influence. But whatever the cause, the representatives of the Company did not bear themselves in a manner which impressed others as to their perfect composure, happiness, and confidence.

However, no one really expected that the Bill would have been dealt with in quite such a despotic manner. Although the opponents went to the fullest extent they could, and asked that it should be thrown out, the utmost they hoped for was that they might succeed in delaying the Bill until after the report of the Powers of Charge Committee was issued, or secure a clipping of the wings of the Company. That the Company are in want of further capital powers cannot be seriously disputed; and it would have been far better, in the interests both of the Company and consumers, if some middle course had been taken by their Lordships. To the onlooker the will of Lord Brougham seemed to dominate the other members of the Committee; and evidently his Lordship last week was bent on doing something sensational. Only two days before the overthrow of the Gaslight Bill, the Committee just as ruthlessly "plucked" the East London Water Company's Bill. Seven minutes' private conference sufficed for their Lordships to come to their decision on the Gaslight Bill; and the blunt, bald announcement of the Chairman that, "The Committee are of opinion that the preamble of the Bill is not proved," came as a thunderbolt in the midst of the representatives of the Horseferry Road administration, and for a few minutes they were struck mute with astonishment and mortification. However, out of the "evil" done, it is to be hoped, that "good may come," and that before the Company again approach Parliament, as they will be compelled to do in a few months' time, they will have seen the folly of persisting in the high, mighty, and infallible attitudes which they have taken up throughout the course of the defunct Bill of the present session.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bill brought from the Commons, read the first time, and referred to the Examiners: Menstone Water Bill.

Bill read a second time: Menstone Water Bill.

Bills read a second time and committed: Birmingham Corporation Bill, Godalming Corporation Water Bill, Local Government Provisional Order (Gas) Bill, Walker and Wallsend Union Gas (Electric Lighting) Bill.

Bills reported: East London Water Bill [preamble not proved], Gaslight and Coke Company Bill [preamble not proved], Gas Orders Confirmation (No. 2) Bill, Scunthorpe Urban District Gas and Water Bill, West Middlesex Water Bill.

Bills read the third time and passed: Belfast Water Bill, Fishguard Water and Gas Bill, Fylde Water Board Bill, Nottingham Corporation Bill, Shirebrook and District Gas Bill, West Middlesex Water Bill, Wolverhampton Corporation Bill, Workington Corporation Bill.

Petitions have been presented against the Derwent Valley Water Bill, by the Chesterfield Rural District Council, the Derbyshire, Nottinghamshire, and Leicestershire County Councils, the Dukes of Norfolk and Rutland, and others. The Duke of Devonshire has petitioned against alteration in the Bill.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills brought from the Lords, read the first time, and referred to the Examiners: Fylde Water Board Bill, Wolverhampton Corporation Bill.

Lords Bills reported: Lowestoft Water and Gas Bill, Southampton Corporation Water Bill [preamble not proved], St. Neots Water Bill.

Bills read the third time and passed: Airdrie and Coatbridge Water Bill [Lords], Barton-on-Sea Water Bill [Lords], Bristol Gas Bill, [Lords], Dundee Gas, &c., Bill [Lords], Gainsborough Urban District Council (Gas) Bill [Lords], Lanarkshire (Middle Ward District) Water Bill [Lords], Maidstone Water Bill.

Last Friday, Mr. M'Kenna, speaking on behalf of Mr. T. Bayley (Chesterfield) asked the President of the Local Government Board whether he saw a reasonable prospect of making progress with the Bill for the greater protection of water supplies, so as to give more extensive powers to Local Authorities to deal with the water supply of the districts under their control; and whether he could see his way to bring in a Government Bill making the County Councils (with the exception of the London County Council, who already have such powers) the Water Authority of their respective districts. Mr. Chaplin replied, in regard to the second part of the question, that he could not give an undertaking to suggest the County Councils as the authority for the purpose in question; and as to the first part, he could not say, having regard to the state of public business, that the prospect of being able to make progress with the Bill referred to was very promising.

HOUSE OF LORDS COMMITTEE.

Thursday June 29.

(Before Lord Brougham and Vaux, *Chairman, the Earl of* Dartmouth, *Lord* Boston, *Lord* Windsor, *and Lord* Bolton.)

THE GASLIGHT AND COKE COMPANY BILL.

This Bill, which was read the third time in the House of Commons on the 11th of May, came to-day before a Select Committee of the House of Lords constituted as above. Its object was to enable The Gaslight and Coke Company to raise additional capital by the issue of debenture stock, and to purchase and hold certain lands.

Mr. Pope, Q.C., Mr. Balfour Browne, Q.C., Mr. Claude Baggallay, Q.C., and Mr. Danckwerts appeared for the promoters. The petitioners against the Bill were represented as follows: The London County Council, by Mr. Pember, Q.C., and Mr. G. J. Talbot; the Corporation of London, by Mr. Littler, Q.C., and Mr. H. A. Rigg; and the Corporation of West Ham, by Mr. E. Morten.

Mr. Pope, in opening the case, said this was a very simple Bill, but one of great importance to The Gaslight and Coke Company. Its object was to seek authority to raise, for the purposes of applying it to the enlargement of the means for supplying the Company's customers with gas, a certain amount of capital. This capital they proposed to raise in a form most advantageous to the consumer, rather than to the Company. The only opponents, really, were the London County Council—he did not know whether the Corporation of the City of London were appearing, but practically they were only crying "Ditto" to the County Council. It was desirable that he should give their Lordships a little of the history of the Bill, and of the position in which it now stood, in order that they might understand the question involved. The Gaslight and Coke Company, which had been made up by large amalgamations and the absorption of a number of small Companies, was now probably the largest Gas Company in the world. They supplied practically the whole of the north of London. The Company had had no capital powers since 1876; and at the time that the original capital powers were authorized, none of the modern statutory requirements upon the Company were in existence, or could be made applicable. The Company had proposed originally to ask Parliament to authorize the raising of £3,500,000; and, of course, they had proposed to give evidence to the Committee in the other House of the amount required for the purposes of meeting the immediate wants and demands, or those which might be anticipated during a reasonable period of time to come. The London County Council intervened very early. Their Lordships were aware that the House of Commons had appointed by resolution last year a Committee to consider and report upon the price of gas in London, especially in the northern districts. A long interval took place before the Committee was actually nominated; but it had been nominated, and had been sitting during the present session of Parliament. The object and duty of the Committee was not, of course, to bring about legislation. It was not clothed with any legislative powers at all, but was simply a Committee for the purpose of enquiry and report upon some of the questions which had arisen lately as to the price of gas. Legislation might or might not follow on their report. If it did, it would in all probability be general legislation; and applicable not to one Company only but in principle to all the Companies in the Metropolis, and such as to bind all Companies coming within its sphere. As soon as this Bill came before the House of Commons, the London County Council sought to induce the House to refuse it a second reading on the ground that the Company ought to await the report of this Gas Committee before asking for further capital powers. Of course, the obvious answer was that it was not a Committee for the report of which the Company's Bill could wait, because its report might or might not involve legislation; and further that, if the Company satisfied Parliament that they required capital, and that for the purpose of supplying the demands of their consumers capital ought to be furnished, it was absurd to say that the Company should wait while further enquiry took place. The House of Commons confirmed that view, and sent the Bill to a Select Committee. When the Company came before the Committee the same argument was again employed; and the Committee were asked, in the first instance, to postpone the Bill in order that the report of the Gas Committee might be received before the question of any further increase of the Company's capital was entertained. The Committee, acting upon the decision of the House on the second reading, declared that no such contention could be listened to for a moment. The Chairman said: "This Bill has passed its preliminary stages in the House of Commons, and has come before the Committee in the usual way, and the Committee see no reason why they should not proceed with it in the usual way." The Committee did proceed with it; and the Company gave them such evidence as they thought sufficient in regard to the requirements of their undertakings in the matter of further capital powers. Before 1876, when they had their original capital powers, all the machinery of the auction clauses and the sliding-scale, and the various safeguards to the consumer which Parliament had since introduced, were unknown. In this particular case, the mode in which they proposed to raise whatever sum of money they were allowed to raise would be by 3 per cent. debenture stock, which would be submitted to auction under the auction clauses which had been embodied under the Gas Regulations. So that, in truth, the shareholders, except so far as it would make their administration and their attention to their customers more satisfactory, would have no possible interest in the amount of capital which was raised. It would not contribute to the dividend, except so far as it supplied the demands of the consumers which would ultimately and naturally arise. It would not receive any dividend, but would rather be a charge on the dividend, because the 3 per cent. would have to be taken as a liability of the Company before the sum was received which would be divisible among the shareholders. It was, therefore, impossible to lay before Parliament a more *bonâ fide* scheme under which the capital could be raised without interfering with the interests of anyone. The London County Council were not there as representing their own interests as a Corporation. They simply appeared to represent the consumers; but it would be impossible, he maintained, to suggest a scheme which could be more in the interests of the consumers and less financially to the interests of the shareholders. The Company had gone before a Committee of the House of Commons with exactly the suggestion he was now making. They had endeavoured to show, and had shown to a certain extent, that they required the capital they applied for, and he would ask their Lordships to listen to them now so far as the amount of capital allowed in the Commons was concerned. The result of the inquiry in the Commons was that the Committee, presided over by Sir William Coddington, were satisfied that it was a legitimate thing to entrust them with the power of raising on 3 per cent. debenture stock £2,500,000, thereby striking off £1,000,000 from the amount of the capital the Company had originally asked for. They had asked for 3½ millions in order that no further application to Parliament might be necessary for a period of twelve years; and the 2½ millions which had been granted the Company they hoped would keep them, if the increased requirements were not larger than experience led them to expect, for another eight years. That was not, he thought, an extravagant period to look ahead in connection with an undertaking of this magnitude and importance. Of course, the Committee would have to be satisfied that it was a reasonable thing to give them the amount of capital asked for, and that the extension of the works and the necessities of the consumer were fairly represented by the demand of the Company. The Committee in the Commons had given them power to raise 2½ millions. Could there be any ground for saying that, if there was a necessity for further money to enable the Company to discharge their duty to the consumers, the granting of it ought to be postponed by the House of Lords till some Committee of the other House had reported on the price of gas in the Metropolis. The price of gas being regulated by the existing statutory powers of the Company furnishing the supply, it was obvious that it would be against the interest of the consumer that he should not have his supply at whatever price it could be furnished; and though the report of the Gas Committee in the Commons might result in some adverse criticisms of the price charged, or some suggestions for legislation, as he ventured to think, it was nonsense to suggest that the wants of the consumers in the district of the Gaslight Company should be ignored or held over until the Committee had reported and the Government had decided whether or not it would legislate. This the Committee would find to be substantially the question raised in this case. He admitted that there was the question as to how much the authorized capital should be. In fact, in the other House, under stress of the logic of the argument itself, the real question between the Company and the City Corporation was that the former had asked for too much. The City stated that if only a moderate amount were asked for, they would not have had anything to say to the preamble. The two things the Committee would have to discuss were: How much the Company required, and whether it should be raised in the way indicated in the Bill—namely, as 3 per cent. debenture stock. Having gone through the Committee of the other House, the Bill passed to its third reading, when the same question was raised, and the House of Commons was asked to postpone this stage, notwithstanding that the Committee had indicated by their decision that they believed that there was an immediate necessity for capital. Such was the persistent attitude of these public bodies. It seemed to be their desire to cripple honest enterprise which, in the interests of the public, they ought rather to foster. The House of Commons, however, refused to postpone the Bill; but even before the Chairman of Committees of their Lordships' House, the same question was raised. He was asked to postpone the Bill until after the decision of the Committee—the thing which the House of Commons itself had repeatedly refused to do. So there they now were to put before their Lordships the simple question of whether this capital was to be raised or not. He was willing to concede the question of amount as one which should ultimately come before their Lordships. Let them look at the petitions, and see if he had fairly or unfairly dealt with the question which the promoters raised. Take first the petition of the London County Council, for they were the most persistent—should he say the most cantankerous—of their opponents. The City Corporation were more reasonable. Well, the petitioners said—

The Company seek powers by the Bill to create and issue debenture stock not exceeding the nominal amount of £2,500,000. The Company

introduced in the last session of Parliament a Bill having for its object the conversion of the then existing capital of the Company into new stock, increasing the nominal amount of the stock and reducing in a corresponding measure the dividend payable on the stock.

From this statement, the Committee would see the operation that Parliament had sanctioned in the case of this Company. It was a principle which had already been sanctioned in the case of the South Metropolitan Company, the Crystal Palace Company, the British Gas Company, and other Companies. It meant a splitting of the stock. Instead of having each £100 of stock in the market worth £300, it raised the nominal capital to double the amount; reducing the dividend to one-half. It was a mere domestic arrangement, by which each shareholder with £100 of stock paying a maximum dividend of 10 per cent. received two shares of £100 each paying 5 per cent. He failed to see what injury this could do to anyone. The petition went on to say—

Your petitioners presented a petition against the Bill for the said Act, in which they pointed out that the effect would be to convert the ordinary capital of the Company, which is entitled to a dividend of 10 per cent. subject to increase or reduction upon a sliding-scale, and other classes of capital bearing various rates of dividend or interest, into much larger nominal amounts bearing dividend or interest at less rates. Your petitioners pointed out that the effect of this alteration would be to cause a large addition to the saleable value of the Company's capital; and that as regards the capital already issued, while it would therefore be advantageous to the shareholders, it would confer no benefit upon the public or the consumers.

But the increased readiness of transfer of stock always increased the market value. A stock bearing 5 per cent. interest could be sold more readily than one bearing 10 per cent. Under the auction clauses, any profit over the amount raised really became non-dividend bearing, and contributed to the supply of the consumer without being a burden on the concern. If anything, this paragraph in the petition was a complaint against what Parliament had done last year; and this showed how hard-pressed the London County Council were in dealing with this matter in a fair and reasonable spirit. The petitioners said—

As regards the capital to be hereafter issued, your petitioners submitted that, while the change would be advantageous to the shareholders of the Company, it would confer no appreciable advantage upon the consumers of gas which would justify the alteration of the law then proposed. Your petitioners further pointed out that the proposal would have the effect of concealing from the public the fact that the Company were paying 12¾ per cent., and other high rates of interest, upon the various classes of their nominal paid-up capital (£11,393,000), which together with a sum of £1,582,800 received for premiums and applied for capital purposes, and also a sum of £130,000 stated to be for "capitalized profits," represented the money received into the capital account of the Company and expended or to be expended on the undertaking, and would cause it to appear that the Company were only obtaining dividend at the rate of £5 2s. per cent. on their ordinary capital, and low rates of interest upon their preference and debenture capital.

All these things had been urged before the Committee in the House of Commons; but the Committee had told the petitioners that they had nothing at all to do with the business in hand—that they were matters for argument between the shareholders and the management of the Company. The petitioners had been obliged to go away contented with that, although they now sought to raise the questions again. The petitioners said—

And your petitioners also contended that the real position of the Company in respect of its capital and its dividend, and the result of the charges made to the consumer, ought not to be concealed in the manner proposed by the Bill. Your petitioners pointed out that The Gaslight and Coke Company were charging 3s. per 1000 cubic feet for gas supplied throughout the greater part of their district—viz., all that part of London which is north of the River Thames—as against 2s. 3d. charged by the South Metropolitan Gas Company; while they charged 2s. 3d. only (the same as the South Metropolitan Company) on the south side of the river.

The petitioners did not point out that there were differences between the condition of things on the north and the south side of the Thames, although when the sliding-scale and auction clauses were adopted as gas regulations, the whole matter formed the subject of a close inquiry in both Houses of Parliament. Most eminent and distinguished Members of Parliament had taken part in the discussion; and the actual price of gas, and the standard price, had varied as between the north and south because those who then adjusted the figures came to the conclusion that the circumstances on the one side and the other differed, and that the same price could not be fixed for both. The Gaslight and Coke Company's standard price was 3s. 9d., and that of the South Metropolitan Company 3s. 6d. Having explained the operation of the sliding-scale, the learned Counsel said the reason why the Company had got a good dividend hitherto had been because they had been able to reduce the price of gas from 3s. 9d. to 3s.—the price having been as low as 2s. 6d.

The Chairman: As I read the paragraph you have quoted, your Company have two prices for their gas.

Mr. Pope replied that they were supplying a small district on the south side. Parliament, when this district was confided to them, put on them the obligation of charging in the south the same price as the South Metropolitan Company.

The Chairman: You are charging 2s. 3d. there, and 3s. elsewhere?

Mr. Pope said that was the case; and they were only able to give the district on the south side this advantage at the expense of the consumers on the north side. He then continued to read the petition—

And your petitioners suggested that the said Bill, if passed at all, should only be passed into law subject to some provisions for reducing the price charged by The Gaslight and Coke Company for gas supplied by them. It was, however, stated on behalf of the Company before the Committee of the House of Commons to which the Bill was referred, that The Gaslight and Coke Company would have to apply to Parliament for powers to create additional capital, and that that would be the proper occasion for dealing with the question of reduction of price.

He repudiated the idea of taking advantage of the position, when seeking powers to meet the demands of their customers, to upset the arrangement made with Parliament on the faith of which they had been carrying on their undertaking. There was one great matter which ought to be considered—viz., the growth of the electric light in the district of the Gaslight Company. This competition had been greater in their district than in that of the South Metropolitan Company. The electric light in the West-end was largely adopted as a luxury, irrespective of cost. The wealthy in their mansions, the clubs and theatres, and so forth, did not regard expense so much as comfort and luxury in their mode of living. The Gaslight Company had had to contend with this competition, with the result that, though they had had their charge for gas as low as 2s. 6d., finding their reserve fund becoming denuded, they had had to raise it to 3s. Though the electric light was a direct competitor of theirs, they were bound to maintain such an amount of machinery and supply as could be made available in the event of any failure of the electric light. The Company were bound to supply gas to those who required it, even though a call was only made when the competitor failed. The petitioners said—

This inequality of charge has always been considered unfair to the northern districts of London; and this unfairness has come recently into greater prominence in consequence of the rise which The Gaslight and Coke Company have made in their charge for gas. Your petitioners understand that the charges made by The Gaslight and Coke Company for gas supplied through automatic prepayment meters were in December last at the rate of 3s. 9·4d. per 1000 cubic feet in that part of the Company's district situated on the north of the Thames, and at the rate of 3s. 4d. per 1000 cubic feet in that part of their district situated on the south of the Thames; and that the South Metropolitan Gas Company were charging for gas supplied through such meters at the rate of 3s. 1d. per 1000 cubic feet (since reduced to 2s. 11d.)

It might be true that, from happy circumstances, the South Metropolitan were able to supply cheaper than the Gaslight Company. They had always been under circumstances; and if the Committee chose to go fully into the matter, he should be glad to give ample explanation. The petitioners then said—

Your petitioners would point out that Clause 39 of the Scheme of Amalgamation of The Gaslight and Coke Company with the London Gaslight Company, dated the 22nd of May, 1883, provides that The Gaslight and Coke Company shall not charge in the districts of the London Company south of the River Thames a higher price per 1000 cubic feet of 16-candle gas either for public or private lighting than the price for the time being charged by the South Metropolitan Gas Company for gas of the same illuminating power. It appears, therefore, that The Gaslight and Coke Company have been overcharging the consumers in their district south of the Thames in respect of gas supplied through automatic prepayment meters.

He had no reply to make to this, because the charge was not the same. A charge for automatic meters was not a charge which was contemplated when the price of gas was fixed. The charge included the capital expenditure which was necessary in the interest of the individual consumer to enable him to avail himself of the automatic supply. Mr. Field would explain that this was by no means in excess of the statutory charge. The petition went on to say—

Your petitioners would point out that the House of Commons resolved on the 21st of June, 1898, to appoint a Select Committee "to inquire into the powers of charge conferred by Parliament on the Metropolitan Gas Companies, and to report as to the method in which those powers have been exercised, having regard to the differences of price charged by the various Companies." This Committee has been re-appointed in the present session, and has received evidence, and is now pursuing its inquiries on the subject referred to.

The Committee would report as to all the Companies, and not as to the Gaslight Company alone. Then they said—

Your petitioners desire to point out that on the 31st of December, 1898, the Company possessed the following powers of issuing capital:—

6 per cent. debenture stock	£175,000
"A" ordinary stock (sliding-scale)	175,000
	£350,000

The issue of these stocks would produce a sum of money estimated at £830,000 or thereabouts. Your petitioners are advised, and allege, that a portion of the ordinary stock has since been issued; but the Company still possess powers to raise funds sufficient for their requirements for two years.

This was an allegation against which, in principle, he made no complaint. The question was whether the Company were asking for too much capital, and this was a matter with which the Committee would deal. The petitioners next said:—

Under these circumstances, your petitioners humbly submit that there is no urgency for the Bill; and that if these powers are granted, the Company will be able to avoid coming again to Parliament for a long period, so that whatever may be the result of the inquiry into the Companies' charges now pending in the House of Commons, the public would, if this Bill passed, be deprived of any opportunity of getting proper conditions imposed upon the Company.

This was not an honest way to put the matter; the petitioners knowing that, if it came to anything, it must be a subject for legislation which would not reflect on one Company only but would have a bearing on all of them. If the Government should come to the conclusion that the sliding-scale, the initial price, the auction clauses, or any statutory requirements which existed, should be varied, they would introduce a General Bill for the purpose, and would not wait to do it until a Company came for capital powers. In reply to the remaining paragraphs in the petition, he submitted that they exhibited fads on the part of the County Council, which he asked the Committee to disregard, and attributed to the Company a desire to convert their debenture stock into ordinary stock, a thing which would be impossible. The next petition, that of the Corporation of London, was practically an echo of the London County Council petition. Then there was a petition from the Corporation of West Ham, who, *inter alia*, said—

The Metropolitan Board of Works were authorized, under the City of London Gas Act, 1868, and The Gaslight and Coke Company's Act, 1868, to purchase the undertaking of the Company so far as without the City of London, and the Corporation of the City of London were at the same time authorized to purchase the undertaking of any Company supplying the City of London; and it is now well recognized that the gas supply of a town should be in the hands of the local authority.

Well, the powers of purchase of the Metropolitan Board of Works and the City Corporation were long since out of date, and no attempt had been made to get them renewed. He demurred absolutely to the proposition that it was now well recognized that the gas supply of a town should be in the hands of the local authority. He agreed that there was a general feeling of this sort in regard to water supply; but he submitted that, in regard to gas, since Mr. Forster's Committee enacted the sliding-scale and auction clauses, the consumer was better served if the undertaking were

in the hands of a company than if it were carried on by a corporation. The Corporation went on to say—

Your petitioners have already obtained powers to supply, and are now supplying, electric light within the borough; and in the event of their obtaining powers to purchase so much of the Company's undertaking as is within the borough, the great addition which, by virtue of the present proposal, would have been made to the Company's capital, would place serious difficulties in their way, and might greatly enhance the price your petitioners would have to pay to the Company. Your petitioners further submit that the amount of such additional capital is largely in excess of the requirements of the Company, and that no increase should be authorized without the most careful investigation as to the financial position and needs of the Company.

The petitioners submitted that, in the event of the further powers asked for being conferred on the Company, provision should be made for a reduction in the standard price. The suggestion amounted to this—that because the Company wanted more money to supply their consumers elsewhere, the Committee should lay violent hands on the proposals of Mr. Forster's Committee so far as this Company were concerned, leaving them untouched with regard to all other Companies. There was really only one question which the Committee had to consider—namely, whether the Company did or did not require the additional capital they asked for.

Mr. J. W. FIELD, *examined by Mr.* DANCKWERTS,

stated that the ordinary capital of the Company before conversion last year was £9,204,000; and by the operation of conversion this was increased to £21,642,992 10s. The debenture stock, which before conversion was something over £2,000,000, became £4,993,000; making a total capital of £25,000,000 odd. Under the Consolidation Act of 1898, the amount of capital uncalled on the 31st of December last year was £437,500 of ordinary stock and £350,000 of debentures. In January and February this year, they raised £187,500 of ordinary capital and £1250 of debentures. The actual amount of money they had raised, including shares, loans, and premiums, was £13,105,800 up to the end of the year 1875, when the Company were last before Parliament. Their expenditure on gas-works and land—largely at Beckton—was £5,670,823; on mains and service-pipes, £2,165,885; on meters let to consumers, £210,299; and on sundry accounts, £102,132. So that, at the date named, the total expenditure had reached £8,149,139. From 1876 to 1898 inclusive, the amount expended on gas-works and land was £2,850,305; on products works and land, £259,065; on mains and service-pipes, £866,589; on meters, £311,532; on stoves, £275,683; on sundry accounts, £29,559—making a total of £4,533,615. The total amount of the expenditure up to Dec. 31, 1898, was £12,682,754. Pending the coming into force of the Act of that year, the Company borrowed £450,000 from their bankers; and they received £80,000 in anticipation of the sales of stock under the Act. Deducting these sums from the uncalled capital, the actual amount remaining available for further outlay at the beginning of the present year, including premiums, was £310,000. They expected to spend this year on gas-works £50,000; on chemical works, £10,000; on showrooms, £8000; on mains and service-pipes, £51,000; on meters, £75,000; and on stoves, £56,000—making a total of £250,000. This would leave for additional cash balance the sum of £60,000 only. Therefore at the end of the present year the Company would be in the position of having no more money. They must have further floating capital. They had been short for some time; and it was quite necessary that they should have a further cash balance with which to carry on the undertaking. They required for gas-works and land £2,500,000; for mains, £280,000; for meters, £140,000; for stoves, £230,000; and for products works, £75,000, besides a large sum for fitting up automatic meters. The total requirements were £3,675,000; being £1,000,000 less than had been expended since 1875. Instead of raising further share capital, they proposed to issue debenture stock. The question had been very seriously considered by the Directors. The Company's capital expenditure had, for very good reasons, been much higher than that of other Metropolitan Gas Companies; and consequently the interest and dividends on the capital had been made a very much larger proportion of the price of gas than was the case with any other Company. Under these circumstances, they wished to raise the additional capital needed on the lowest possible terms; and they therefore desired to try the experiment of obtaining the whole capital by debenture stock. They anticipated that this would result in a considerable saving, which, of course, would benefit the consumer by causing a reduction in the price of gas. If the whole of the proposed capital were raised by means of shares, 4¼ to 4½ per cent. would have to be paid; and therefore to raise it by debenture stock effected a saving. Since 1875, the manufacturing power of the Company's works had been raised by 65 million cubic feet daily. The increase in the sale of gas since 1875 had been from 10,000 millions to 21,000 millions per annum, or 110 per cent. At the close of 1875, the total capital expenditure per 1000 cubic feet of gas sold was 16s. 4d., or £816 per annual million—that was, per million sent out during the year. This expenditure had now been reduced to 12s. 1d. per 1000 cubic feet, and to £604 per annual million. His Company's annual sale of gas was 21,000 million cubic feet; and the difference in capital expenditure between his Company and the South Metropolitan per million feet being 3s. 6d., this represented an outlay of £3,675,000 against his Company. The Gaslight Company's charge for gas in 1876 was 3s. 9d. per 1000 cubic feet; and the lowest since that date had been 2s. 6d., in the year 1889, about which time there was a series of good years with cheap coal and low wages. The present price was 3s., or 9d. less than in 1876. The criterion that governed the amount of capital to be expended and the works that must be had, was the greatest delivery of gas in any one 24 hours. Whereas if every day's delivery were equal the proportion would be, 1-365th, in the year 1891, when their largest day's delivery occurred, the maximum day's delivery of his Company was 128,207,000 cubic feet, or 1-161st of the annual make. During the past four or five years, there had been no foggy weather and no frost; and therefore the maximum day's delivery had been less. The largest day's delivery of the South Metropolitan Company was in 1897, and amounted to 47,552,000 cubic feet, or 1-197th of their annual make; and the maximum day's output of that Company in 1898 was 45,224,000 cubic feet, on 1-217th part of their year's make. The difference, therefore, was against his Company; so that his Company had to keep a greater amount of capital idle during a large part of the year. If his Company's district were largely residential, the demand would be more equal. People who adopted the electric light as a rule kept their gas-services, and the Company had to be prepared to supply them if required to do so. In the case of the Great Central Railway Station, the two fittings had been put up side by side; and in the event of a breakdown of the electric light, there would be a sudden call on the Company. All these things necessitated a large amount of idle capital; the Company being compelled to supply when called upon at a given pressure. The Gaslight Company had 200,000 gas-stoves in their district. They had induced people to take these stoves; and it would never do for them to keep them short of gas. The Company had also 4000 gas-engines to supply, for which a certain pressure was requisite. They were now able to cope with almost any demand that their present consumers might put upon them, and were in a position to meet a maximum demand of 140 or 150 million cubic feet. Both the stove business and the automatic-meter supply were largely increasing; and this was one of the reasons why they were now asking Parliament for further capital. The automatic-meter business could only be met by a very large increase of capital expenditure. The capital generally required by gas-works was £300 per annual million, and for distribution plant about another £100. Their estimate for the coming twelve years amounted to £392 per million cubic feet of annual output. Witness then explained to the Committee the working of the automatic-meter business. He said the Company charged north of the Thames 3s. 9½d. per 1000 cubic feet in 1899—3s. being for the gas, 1½d. for stove-rent, and 8d. for fittings. The charge south of the river was 3s. 4d.—2s. 2d. for gas, 1½d. for stove-rent, and 1s. 0½d. for fittings. The average cost of the instalment per house to the Company was £8 14s. The Company had already supplied some 100,000 of this class of consumers, so that they had had to spend about £900,000. The object of the automatic supply was to reach a class of consumers unable to provide their own fittings, and to whom the Company could not afford to give credit, and who could not deposit a security. It was only during the last five or six years that this class of people had been able to be supplied with gas; and the new system had become very popular all over London. The £3,500,000 new capital asked for in the original Bill would have lasted for twelve years. The House of Commons Committee had cut down this sum to £2,500,000, which he calculated would suffice for the next eight years. The number of their consumers had increased since 1883 by 89 per cent. If the Company obtained no new capital powers at all, they would after the present year be at the end of their tether. The rate of increased consumption he had taken for the purpose of his calculation was 3 per cent.

In cross-examination by Mr. E. MORTEN, witness said that the Company's works were not now capable of producing day by day the maximum demand; but they could produce the average daily demand. He considered it was the duty of the Company to invest a large amount of capital on works that would be needed if every customer was to be supplied when the maximum demand was made.

Mr. MORTEN: Is there any other Company in the world who make such a provision as that?

Witness: If they are prudent people, they do.

Do the South Metropolitan Company?—Mr. Livesey said the other day that, rather than do it, he would check the supply of gas.

That means by supplying it at a slightly lower pressure?—Yes; but a consumer has a right to have the gas he requires. On a very frosty day, to say that a consumer is to be deprived of the gas he needs for his gas-stoves, is not, in my opinion, honest.

They only pay for the gas they get?—But what is the use of having stoves, if they cannot get gas? If gas were supplied at only half the usual pressure, that might cause the stoves to light-back.

Asked to what he attributed the difference in price between the gas supplied by the South Metropolitan Company and that supplied by The Gaslight and Coke Company, witness said that the South Metropolitan had had a very large increase in consumption; and had also been able to construct works at a cheap rate. He expressed the opinion that The Gaslight and Coke Company's capital had always been expended to the best advantage, and said it had never been shown to be otherwise. He thought that the money spent at Beckton was expended to the best advantage. The land at Beckton was marshy; but he was not aware that it was waterlogged. The transfer of the works to Beckton cost £1,500,000. Though the Company at the time had no auction clauses and no sliding-scale, they issued the whole £1,500,000 as 5 per cent. preference shares, when they might have issued it at 10 per cent. The gas sent out by the Company was better than that supplied by the South Metropolitan Company. One reason why the cost of production was higher north of the Thames than it was on the south side, was that The Gaslight and Coke Company had to pay more for their coal at the up-town stations, whither it had to be conveyed in lighters. They had a very large station at Kensal Green; and the lighterage thither cost 2s. 6d. a ton. Asked whether it was not the case that the South Metropolitan Company had their own lighters and The Gaslight and Coke Company had not, witness said that his Company were not lightermen. He admitted that the South Metropolitan Company had introduced machine stoking to a much larger extent than his Company had done. The Gaslight and Coke Company, however, had been trying to restrict expenditure lately, owing to the dearth of capital; and their retort-houses were large, old-fashioned ones, in which machine stoking could not easily be employed.

Friday, June 30.

On the resumption of the proceedings this morning,

Mr. FIELD *was cross-examined by Mr.* MORTEN.

Witness said the Company were really selling their gas on the south side of the Thames about 1d. per 1000 cubic feet cheaper than the South Metropolitan Company. The dividend on the original capital last year was 12¼ per cent.; and this year, on the stock as converted under the Act of 1898 the standard dividend would be 4 per cent., subject, of course, to the operation of the sliding-scale. The market value of the old stock was about £320, and that of the new stock about £108.

Mr. MORTEN: Have your Company ever suggested to the shareholders that, looking to the circumstances of the case, it would be well to get rid of the portion of the undertaking south of the Thames?

Witness: No.

Or that it would be right to reduce your dividend to get your house in better order?—We could not do that, because the whole of the Company's stock since 1876 has been sold by auction; and when the stock was put up to auction, the advantages of the Company were set forth, and the buyer knew well that if the gas were sold at a price below the standard he would get a further dividend.

Has there been an increase or decrease in the Company's business of late?—A decrease, but not on the general business.

If you leave out the automatic meters, there has been a decrease?—If you want to know the business, you must not leave out the most profitable part.

You are coming to Parliament now to give you a free hand for the next ten years, to go on in the future as in the past, with no prospect of a reduction of price unless there is a great increase of business?—The reduction in the price of gas depends not only on the increase of business, but on the reduction of the cost of material, coal, &c.

In cross-examination by Mr. Littler, witness admitted that he had stated to the Committee of last year that the reason why the Company did not ask for further capital then was that it was not wise to come to Parliament before one was obliged. His Company had not been to Parliament since 1876. He remembered Mr. Pope stating, on behalf of the Company, that the proper time to consider price was when they came for fresh capital. Parliament might impose any obligations it pleased upon them when they came for capital.

Has every iniquity under the sun been imputed to your Company before the Committee of the other House, sitting on the gas question?—Very nearly.

And that Committee has not come to any decision yet?—No; but I hope it will soon.

Witness went on to say that his Company had the largest gas capital in the world. It was about, though not quite, four times that of the South Metropolitan Company. The Gaslight Company's capital in 1898 was £13,000,000 to the £4,000,000 of the South Metropolitan.

Mr. Littler: The average price of the South Metropolitan Company in 1878 was 3s. 5½d., and it is now 2s. 2d., and the reduction is 1s. 3½d. Your reduction is only 9½d.?

Witness: Yes; but our actual reduction has been 11d. per 1000 cubic feet, and theirs 1s. 2d. When I say their reduction, it must be borne in mind that in 1876 they had not amalgamated with the Phœnix Company.

The South Metropolitan have to meet every charge that you have, with the additional one of profit-sharing with their workmen?—Yes; but their wages are proportionately less than the Gaslight Company's.

In further cross-examination, witness said the reduction in the rate of increased consumption in later years had been brought about by the competition of the electric light and the mild weather. He could not say that the former was increasing. At times, when the market favoured it, they got over-drafts from their bankers. In 1898, the gross revenue of his Company was over a million, and their net profit was also upwards of a million. The average price of the gas at Rochester, which was remote from coalfields, was 2s. 6d., and at Bristol it was only 2s. 4d., as compared with the 3s. charged by his Company north of the Thames. The illuminating power of the Bristol gas was, however, only 14½ candles, against their 16 candles. The larger the undertaking, the cheaper it ought to work, if other conditions were equal. He anticipated that the 2½ millions would last the Company for eight years, taking the capital expenditure at about £300,000 a year. The difference between the price charged by his Company and other Companies north of the Thames had increased in recent years. It was the fact that there was a difference of 9d. between the Gaslight Company's price north of the river and that of the South Metropolitan Company, so far as private consumers were concerned; but it was not fair to treat their price as 3s., because they charged only 2s. 2d. for public lighting.

Cross-examined by Mr. Talbot, witness said the automatic consumers in the first half of 1897 took 508 million cubic feet, or over 1000 million cubic feet in the year. The sale to ordinary consumers was about stationary; but it was not fair to exclude from the general consideration one of the most important items. They could not say what the future addition to the automatic consumers would be. The 1500 millions now sold to those consumers would, they were satisfied, be largely increased. The demand for capital in the Bill was based upon the assumption that a 3 per cent. increase would take place, on the average, in the next ten years. The rate of increase of the automatic-meter supply was diminishing. During the period from 1884 to 1898, the rate of increased consumption had been 400 million cubic feet per annum, or a total increase of 5600 million cubic feet. In regard to capital expenditure up to 1891, his Company had been chary of laying out money; but during the last eight years they had made up the leeways. From 1882 to 1889, his Company were not spending sufficient capital to maintain their works. The amalgamations of the Gaslight Company with other Companies had turned out to be advantageous both to them and to the public. In regard to the loan from their bankers, it was paid off every year out of revenue; and it would be very unfortunate indeed if they paid 5 or 6 per cent. for this money when they could get it for less from a banker.

Mr. Baggallay said he could not complain of the line of cross-examination; but he thought that he ought to say, as a reason for not following the figures gone into, that Mr. Field was in the middle of his examination before the Select Committee of the House of Commons, and, of course, the cross-examination before their Lordships was relevant to the other inquiry into the position of the three Companies, which might or might not result in legislation. Here, so far as he could see, the figures could only be pertinent to this extent—to ask their Lordships to limit the capital or stop the Bill pending the report of the other Committee. The House of Commons had passed the Bill; Lord Morley had refused to stop it; and Mr. Lowther had pointed out that anything resulting from the Committee of Inquiry would be the basis of future legislation.

Mr. Talbot said his cross-examination had been directed to the point of the amount of capital needed to cope with the future business of the Company.

Re-examined by Mr. Baggallay, witness said the initial prices fixed in 1876 were, in the case of the Gaslight Company, 3s. 9d.; the South Metropolitan Company, 3s. 6d.; and the Commercial Company, 3s. 9d. Attached to these were the auction clauses. The prices that were being charged at that time were 3s. 9d. by his Company; 3s. by the South Metropolitan, and 3s. 9d. by the Commercial. The Gaslight Company then charged meter-rents, the South Metropolitan Company did not, and the Commercial Company did. The actual charges at present were 3s. for themselves, and no meter-rents; 2s. 2d. for the South Metropolitan, *plus* meter-rents; and 2s. 6d. for the Commercial, *plus* meter-rents. They had therefore reduced their charge by 9d., and abolished meter-rents, equal to ¾d., making 9¾d. The South Metropolitan had lowered their charge to 2s. 2d. *plus* meter-rents, or 9½d.; so that his Company had really brought down their charges by ¼d. more than the South Metropolitan. But in 1876 the South Metropolitan Company had not amalgamated with the Phœnix Company. At the time of this amalgamation, the Phœnix Company were charging 4d. per 1000 cubic feet more than the South Metropolitan; and to this extent they were not justified in taking 3s. as the South Metropolitan price in 1876. In the case of his Company and the Commercial in 1876, Parliament fixed the standard at the price then charged; but they put that of the South Metropolitan Company at 3s. 6d. —thus giving them a margin of 6d. Consequently, the circumstances of the Companies must then have been different for different standard prices to have been fixed; and their relative positions were very much the same now. The Commercial Company had reduced their price from 3s. 9d. in 1876 to 2s. 6d. *plus* meter-rents. There were only 7000 of the 300,000 consumers of the Company in West Ham. The folly of the comparison between his Company and the Bristol and Rochester Companies was that people did not take into consideration the different conditions. His Company had to supply gas upwards of ten miles from the point of manufacture; and this had an influence on the actual candle power which had to be maintained at the works. They had sometimes, in bad weather, to send out 17-candle gas in order to comply with the testing requirements; and to raise the illuminating power of the gas one candle cost 2d. per 1000 cubic feet. It was quite true that the Bristol Company, according to their test, supplied what they called 16¼-candle gas, and the Rochester Company 15-candle gas; but this depended on the circumstances of the test. There was no gas tested with such rigour as that supplied by the Gaslight Company. Rates and taxes, too, were paid in Bristol to the extent only of 1·47d., and in Rochester 1·1d. per 1000 cubic feet; but the Gaslight Company paid 2·5d. The real difference in the price charged by his Company and the South Metropolitan in 1898 was 7·38d. First of all, the 10d. was reduced to 9½d. by the abolition of the meter-rents, and this included the 1d. reduction made this year by the South Metropolitan; and the other difference was accounted for by the fact that they had to supply their district south of the Thames at 2s. 2d. It was not fair, when comparing the Gaslight Company with the South Metropolitan, to take their maximum price only. The true percentage was the average price they got.

By the Chairman: The 3s. extended over the larger area.

Re-examination continued: The Gaslight Company received last year, from all the consumers together, 2s. 10·6d. per 1000 cubic feet, the South Metropolitan, 2s. 2·35d. *plus* meter rent, or 2s. 3 2d. Of the true difference—7·38d.—0·85d. was due to the cost of coal. The coal was more expensive primarily, and the cost of lighterage to such stations as Kensal Green, Shoreditch, and Haggerston was very great. The cost of lighterage amounted to £56,000 a year. The only canal lighterage which the South Metropolitan Company had to incur was in respect of their works in the Old Kent Road. It was the cost of lighterage over the South Metropolitan which explained the difference between the two Companies. The Gaslight Company reduced their manufacturing operations as much as possible at some of their stations during the summer, so as to lessen the cost of lighterage. They had to supply a somewhat better gas than the South Metropolitan Company, because gas lost its illuminating power as it travelled along the mains; and his Company used more enriching material per 1000 cubic feet, which, *plus* the lighterage, made up the difference. They bought their coals as cheaply as the South Metropolitan. In regard to coke, last year the reduced revenue at Beckton and Bromley, as compared with the rate at the other stations, was £60,000, because at these stations there was no local trade, and they had to sell the coke at wholesale prices. Owing to the South Wales strike, last year, the whole of the in-town stations were doing a good trade at advanced rates; but at Beckton they got no higher price. The £60,000 represented 3s. 4d. per 1000 cubic feet of gas sold. His Company's wages were ¾d. per 1000 cubic feet more than those of the South Metropolitan Company, which was largely owing to the fact that the South Metropolitan had adopted steam-stokers to a larger extent than they had. The construction of some of the Company's retort-houses prevented them from adopting this kind of stokers; but as they reconstructed they would be able to adopt them. They knew they were already overburdened with capital and revenue charges; and the Directors could not undertake such a large reconstruction as would be necessitated to introduce steam-stokers. They were already in use largely at the Beckton works. The Gaslight Company was a large one before the South Metropolitan Company developed; and therefore their works were older. His Company also incurred heavy charges on account of the expensive pavements with which they had to deal, which entailed extra expenditure in renewing mains, and also led to the loss of gas owing to the difficulty of detecting leaks. The cost of opening and restoring such roads would be twelve to twenty times as much as in the case of a gravel road. The actual number of additional consumers last year was upwards of 24,000, of whom 19,000 were people taking their supply through automatic meters. The improvements effected in the last few years in gas-burners he thought would largely check the advance of electric lighting. They had an increasing quantity of piping to maintain, and they got a smaller amount of profit per mile. In order to meet the fullest possible demand that might be made upon them in case of failure of the electric light, they had to keep their storage and manufacturing plant always equal to what might be required. They could not reduce the pressure, which was tested by the London County Council; and the Company were obliged, under penalties, to keep it up. The Consolidation Bill of last year was quite heavy enough alone; and they wanted to get it finished before dealing with the question of capital. His Company must have more capital at once. It took the Engineers something like two years to get their plans in full working order.

By the Chairman: They could reduce their price by lowering their dividend; but Parliament had compelled them to sell their shares by auction, and they did not think it would be fair to debar the buyer of any of the advantages he had been led to expect. All the capital raised since

1876 had been sold by auction, and a premium paid thereon. Of the £13,000,000 of original capital, upwards of £2,000,000 had been raised under the auction clauses.

Mr. G. C. TREWBY *was next examined.*

He said he calculated that, of the £2,500,000 additional capital to be authorized by the Bill, about £1,700,000 would be needed in his department in the next eight years. He thought it essential that this sum should be spent if the work of the Company was to be efficiently conducted. This meant that the Company would have to come to Parliament again in another eight years. The works of the Company had been designed with the greatest care, having regard to both efficiency and economy. He regarded them as really model gas-works. Last winter the Company had a margin of manufacturing power, because the weather was clear and free from fog; but if they had a bad winter, they would soon be at the end of their manufacturing resources. It was possible for bad, dull weather to last for a week without intermission; and it was necessary to make provision for meeting such a contingency.

In cross-examination by Mr. RIGG, witness said that all the works at Beckton were up to date, except that the Company had stoking machinery applied only to half the retort-houses. Such machinery reduced the expense of stoking, and lightened the labour of the men. It was the case that the Company's carbonizing wages amounted to more than those of the South Metropolitan Company, who had more steam-stokers at work. Of the £1,700,000 to be spent on works in the next eight years, £200,000 would go in providing stoking machinery at Beckton, and £54,000 in providing such machinery at other stations. The rest of the £1,700,000 would be entirely devoted to new works. The business of the Company was increasing; and the proposed new works were intended to meet the prospective increase. He had every reason to believe that there would be a 3 per cent. increase in the demand for gas, and provision must be made beforehand to meet such increase. The Company could not wait until the demand was actually made, or they would find themselves in a difficulty, as the works would take two years to construct.

Mr. G. F. L. FOULGER, *examined by Mr.* BALFOUR BROWNE.

He said he was Distributing Engineer to The Gaslight and Coke Company. His duty was to take charge of the gas immediately it left the generating stations; and he was responsible for it until it reached the consumers. The Company had twenty sources of supply in all; and in one case the distance between the manufacturing station and the place of supply was 17 miles. Practically one-half of the Company's gas was manufactured at the Beckton works alone. There was a system of high-pressure mains, ranging from 48 inches down to 14 inches internal diameter. There were 69 miles of high-pressure mains, and upwards of 2000 miles of cast-iron mains at district pressure. The Company had 87 gasholders; about half of them being allocated to Beckton gas. It was necessary, as the population of the suburbs increased, to make provision for an increasing demand; and he estimated that £934,000 would be needed in the next eight years for the purpose of providing further distributing plant.

Mr. BALFOUR BROWNE: It has been suggested, on behalf of the Corporation of West Ham, that one way to meet the difficulty of a sudden large demand on the resources of the Company would be to reduce the pressure of the gas. What do you say to that?

Witness: I think that would be very dangerous in a district like ours. In the first place, when heavy weather comes on, the consumers of gas themselves have unfortunately the means of very considerably reducing the pressure by opening all the taps to the fullest extent. If, in addition to this, we are to reduce the initial pressure, I have no hesitation in saying that in the up-town districts we shall unquestionably extinguish all the signal-lights which are in every case lighted with gas on the Underground Railways. London is now becoming honeycombed with underground electric railways. The Board of Trade will not rely on the electric light for signals, but will have gas. As you go down into the ground with your gas, you lose pressure; and I say that to reduce the initial pressure in heavy weather, when the pressure in the district is being lowered almost to a dangerous point by the consumers turning on their taps, would be a source of great public danger.

Further than that, it would not be honest to the consumers, would it?—No.

What would be the effect on the heating and cooking stoves?—Well, they would be perfectly useless at the very time they were wanted. There is also a tendency, with both heating and cooking stoves, to light-back at a low pressure. This would be a source of danger, because many of the smaller stoves which are bought by the consumers themselves are connected by means of a piece of india-rubber tube; and there is a possibility of the melting of this tube, and the setting fire to the gas, and possibly to the clothes of the persons using the stoves.

The CHAIRMAN: I gather that your pressure is very much higher than is required by statute.

Witness: Yes; it is about three times as high as the statute requires. In 1847, when the statutory regulation was made, gas was used almost exclusively as an illuminating agent.

Mr. BALFOUR BROWNE: You supply a considerable quantity of gas also to be used as motive power for engines?

Witness: Yes; we have about 4000 gas-engines in our district. The effect of a diminution of pressure on these engines would be very serious, because if you reduce the pressure when the gas-engine is working you extinguish the gas, but do not prevent some of it escaping into the premises; and a large number of gas-engines are left to themselves after they are started.

Did you not recently have a case where there was an accidental diminution of pressure, and a claim on that account was made by the proprietor of a gas-engine against the Company?—Yes; on that very ground.

Under all these circumstances, you say that the suggestion made by the Corporation of West Ham is not practicable, and would be very dangerous if carried out?—Yes; and I would like specially to deal with the question as it concerns West Ham. Since Parliament authorized the construction of the Albert Docks, our Silvertown works, which supply West Ham, have been on an island; and we have a pressure which will send the gas underneath the docks to the depth of 55 or 60 feet. There are a very large number of factories in West Ham; and gas is used very freely in them. Among them are chemical works and large india-rubber works, in which gas is very largely employed. As these factories have large supplies, the service-pipes from our mains are in some cases very nearly equal in size to the mains themselves. By opening them to the fullest extent there is a possibility of almost altogether exhausting the mains on the other side of the dock, because if the initial pressure were reduced that which is necessary for sending the gas underneath the docks would be absolutely exhausted. Therefore the very last place in which I would resort to such an arrangement as that would be West Ham.

Therefore the place that makes the suggestion, is the very last place you would apply it to?—Yes.

In the interests of the public safety?—Yes.

The witness was not cross-examined.

Mr. THOMAS WILTON, the Superintendent of the tar and ammonia products works at Beckton, expressed the opinion that, in his department, £50,000 would have to be expended during the next eight or ten years.

This was the case for the promoters.

Mr. LITTLER, addressing the Committee on behalf of the Corporation of London, said he did not propose to call any witnesses. He had felt some difficulty as to the course he ought to follow. The House of Commons Committee on the Metropolitan Gas Charges had already sat, under the presidency of Mr. Rankin, for eleven days; and, on the whole, he did not think he ought to attempt to inflict a similar inquiry on this Committee. One reason was that it would be somewhat absurd to have two inquiries running on parallel lines. Mr. Pope made a point of the fact that the Bill had been allowed to proceed in spite of the existence of Mr. Rankin's Committee. But there was a difference between allowing a Bill to go before a Committee, and saying what would happen to it when it got there. It was one thing to send a Bill to a Committee, and another thing to pass it. He asked the Committee to throw out the Bill, because he said that the Company ought not to be allowed, under existing circumstances, to have the money they asked for. The Gaslight and Coke Company were now charging 10d. more for gas than the South Metropolitan Company, though it had the largest gas-works in the world, with a rich district on the northern side of the Thames. The Company asked the Committee to be allowed to go on for eight years, in the same way as they had been doing in the past—no matter what might happen at the inquiry before the other House, and though they might be accused of almost every sin that could be alleged against a Gas Company. The Company had carefully avoided coming to Parliament for many years; having laid down the policy of keeping away from Parliament as long as they could. The complaints made before Mr. Rankin's Committee with regard to the way in which the Company's business had been conducted, had been loud and unanimous. The Company asked the Committee either to pass the Bill or to investigate all over again the complaints made before Mr. Rankin's Committee. From his point of view, this was unnecessary, because the Bill was not needed. Last year the Company converted their stock, so as to make it more manageable and more marketable; and the result had been to increase its price in the market. The London County Council were raising most elaborately before Mr. Rankin's Committee the whole of the matters that it was desirable to consider in connection with the administration of the Company's undertaking; and the Company were trying to steal a march on the County Council by asking for such capital powers as would enable them to keep away from Parliament for a considerable number of years. Mr. Rankin's Committee might report in favour of the Company's undertaking being acquired by some public authority. If so, the fact that the Company had obtained this additional capital—in the event of the Bill passing—would have to be taken into consideration; while their high standard price and the high price they charged for their gas would be put before the arbitrator as tending to increase the money value of the undertaking. They did not at present want any more money. At the end of this year, on their own showing, they would have a surplus of £60,000, even if they continued to expend their money on a scale which could not on any ground be justified, because it had been admitted that they had lost considerably by the competition of the electric light. The Company had an income of £1,000,000 a year; and could anybody doubt that, if they wanted a few hundred thousand pounds to carry them on for another session of Parliament, they could easily borrow it from their bankers? The idea on which they had acted was to carefully stay away from Parliament until they thought they could hold up interceding hands to the Committee and say: "Oh, what are we to do unless you let us have this Bill?" They supposed that the Committee would feel bound to say: "Well, you must have something to go on with," and would give them something. When the Bill was originally introduced, it provided for the raising of £3,500,000. The House of Commons had cut this amount down to £2,500,000; and he (Mr. Littler) asked their Lordships not to give them any powers whatever. They could get along perfectly well with the money they had in their pockets until the middle of next year, when they could get such a Bill as would be consistent with the report of Mr. Rankin's Committee. If the present Bill were passed, the whole of the labours of Mr. Rankin's Committee would be thrown away so far as any practical purpose was concerned.

Mr. POPE: If the House of Commons Committee reports, legislation will follow.

Mr. LITTLER said that, in all probability, legislation would not follow. The chances of legislation would depend on whether the Government had or had not time to introduce a Bill. If they had not time, there would be no legislation; and their Lordships knew what chance there was of getting a Bill of the kind through the House of Commons. No mischief would be done to anybody by the rejection of the present Bill, while a very great deal of mischief would result if it were passed. He therefore asked their Lordships to say that the Bill should not proceed.

Mr. TALBOT then addressed the Committee for the London County Council. He said, in regard to the estimated increase of the Company's business, that, looking to the figures Mr. Field had admitted, showing the stationary character of the Company's ordinary business, and the diminishing ratio of increase of the automatic-meter business, the estimate was over-sanguine. As the business of the Company increased, the rate of percentage would tend to decrease; and it would be fairer to take the figures as to which there was no contest, showing the actual amount of increase in the period of fourteen years before. Supposing the same increase was kept up—which was unlikely, owing to the increased

competition—this capital would keep them out of Parliament for 12½ years. The check on the Company, which had not come to Parliament for 23 years, would not be able, therefore, to be kept up. The Council took the same view as the Corporation, that it was not necessary to go into the case before the Select Committee against the Company; but if their Lordships obtained a record of the Committee's proceedings, they would be satisfied that the Committee regarded it as a serious case, and one requiring an answer. Supposing the Committee made practical recommendations as to price, and this Company came next year for further capital, which they would have to do if their Bill were not passed, these conditions could then be imposed on them. But if the Committee gave them a clear acquittal, they would then get their increased capital as a matter of course, and the Council would be satisfied that they should do so. He would ask their Lordships to oblige the Company to come again next year. Unless the £450,000 borrowed from their bankers were charged to capital, there was no urgency for the present Bill; and the increase of their business could be met by the capital they had. It must be admitted that it was a most extraordinary fact that this great Company should be charging for their gas 9½d. per 1000 cubic feet more than their neighbours on the other side of the river. It was thought worth while to say that this figure was not correct. Mr. Field had endeavoured to account for the difference, and had said the 9½d. should be reduced to 7d. It was said that the South Metropolitan Company had reduced their price 1d. this year; but that was an argument against the Gaslight Company. They also asked the Committee to strike an average over the whole of their district. But they had chosen to amalgamate themselves with a Company south of the Thames; and the result of the amalgamation was that the people on the north side were paying more in order to enable the Company to charge the people in the south less for their gas. If they were really at the end of their tether, the County Council would raise no objection if their Lordships gave them sufficient capital to carry them over till next year; but the Council submitted that the Company ought not to be allowed to stop out of Parliament longer.

Mr. Morten, for the West Ham Corporation, said his case was identical with that of the City Corporation and the County Council. He should, however, like to emphasize the point that the promoters of the Bill had assumed throughout their case that the result of a report hostile to the Gaslight Company by the Select Committee of the House of Commons would necessitate legislation. That was something which might turn out to have no foundation; but the Company did know that one result of a hostile report would be that if they came to Parliament and asked for capital powers, they would be put on terms which would compel them to set their house in order. They were really asking their Lordships to give them a free-hand for the next eight years to go on as they had in the past without giving Parliament an opportunity of exercising any control over them. It had been said that he had suggested that the pressure should be reduced to meet any extraordinary demand. That was a misrepresentation. The suggestion was this: The Company had storage capacity sufficient for one day's average consumption; and the highest demand ever made had been for 33 or 35 per cent. in excess of the average day's output. At the time of year when extra demands were made, the Company's storage would be full. So, assuming that they had for three days the highest demand upon them, they would be able by the aid of their storage and average output, to give a supply of gas without any reduction of pressure whatever. There was no reason to suppose that any reduction of pressure would be necessary. The suggestion that their working expenses necessitated an extreme charge was only really an admission that, at some period of their existence, there had been mismanagement and want of foresight. The Bill might be put back; but the fact remained, and this mismanagement was inflicting a hardship on the present day consumers. The question when this took place was now before the Select Committee, who possibly might be able to fix the period. Meantime, there was no ground whatever why the Company should be entrusted with power to go on for any length of time doing as they had done in the past.

The Committee then deliberated in private for a very short time; and on the public being re-admitted,

The Chairman said: The Committee are of opinion that the preamble of the Bill is not proved.

Proposed Purchase of the Knottingley Gas-Works.—At their meeting last week, the Knottingley District Council decided to write to the local Gas Company, inquiring whether they are prepared to dispose of their undertaking, and if so upon what terms. It was complained that the charge of 4s. 2d. per 1000 cubic feet was excessive. The Clerk was also instructed to ascertain the terms upon which money could be obtained for the purchase.

Newtown Urban District Council and the Gas Company.—The Newtown Urban District Council having opposed the Provisional Order applied for by the Newtown Gas Company to enable them to maintain and continue their present undertaking, the Confirmation Bill containing the Order recently came before a Select Committee of the House of Lords, presided over by the Earl of Camperdown. The Council asked for the insertion of a purchase clause; and the Committee complied with the request.

Goole Water Supply.—The Bill promoted by the Goole Urban District Council to obtain power to borrow £25,000 for the purposes of their gas and water undertakings has lately been under consideration by a Select Committee of the House of Lords presided over by the Earl of Camperdown; and last Tuesday clauses were submitted to carry out the decision come to in the course of the inquiry: (1) The District Council should be bound to afford, free of charge, such a supply of water as an Arbitrator, to be appointed by the Board of Trade, should consider equivalent in the case of any wells, pumps, ponds, or watering-places the water supply of which may be prejudicially affected or diminished by the powers conferred by the Act; (2) that such supply should have priority to other supplies authorized by the Act; (3) that if it should be agreed upon, or in the opinion of the Arbitrator the Council should be unable to supply such water, compensation in money should be made to the owner aggrieved, the amount to be determined by the Arbitrator; (4) the Council, in default of supply, to be liable to a penalty of £10 per diem; (5) the Council, on giving notice, to have power to test wells.

HOUSE OF COMMONS SELECT COMMITTEE.

Tuesday, June 27.

(*Sir* James Rankin, *Chairman.*)

THE POWERS OF CHARGE OF THE METROPOLITAN GAS COMPANIES.

The Select Committee of the House of Commons on the above subject met again to-day.

Colonel Makins *was called.*

He stated that he had been a Director of Metropolitan Gas Companies for 33 years—viz., of the Western Gaslight Company from 1866 till 1872, when it was amalgamated with The Gaslight and Coke Company, to the Court of which he was then transferred; continuing an ordinary Director till 1883, when, on the retirement of the Hon. R. H. Browne, he became Governor. He had really had no intention of offering evidence before the Committee, as looking to the terms of the reference it appeared to him that the evidence required was mainly historical and statistical; and that class of evidence could be much better and more fully given by the responsible officials of the Company than by a Director. But after the attack on the management by Mr. Livesey, witness thought—and his colleagues agreed with him—it was necessary he should present himself before the Committee, as otherwise the public might think the Gaslight Company had no answer to the charge, and admitted the justice of it. Mr. Livesey had given as his opinion that there was no reason why gas should not be sold by The Gaslight and Coke Company at the same price as other Companies, except for persistent incompetence and incapacity on the part of the management. Witness would point out who the gentlemen were who were incompetent. There were seven Directors of the Company. Six of them had been Directors of Gas Companies for periods varying from ten to forty years; three of them had been Directors over thirty years; four of them were Chairmen of Gas Companies in the Metropolis or adjacent districts, all of which Companies were more or less successful. Only one of the Directors had not had experience as a Gas Director; but he for many years had been a Director of the most important, and certainly the largest, of the Water Companies—the New River Company. Another of the Directors stood quite at the head of the list of those who had undertaken large works of construction—main laying, and so on, in connection with Water Companies—and was a member of the House of Commons. He referred to Mr. John Aird. The three principal officials of the Company, he presumed, were included in the charge before the Committee; but all of them had had experience extending over more than thirty years. All of them occupied high positions in their respective professions. The charge of incapacity had been made solely by Mr. Livesey; it had not been endorsed or put forward, as far as he was aware, by anybody else. In a speech on Feb. 4, 1898, at one of the meetings of The Gaslight and Coke Company, Mr. Livesey said practically the shareholders were careless and avaricious; and that as long as they got their dividends, they took no interest in the management of the Company, and did not care how it was managed. Well, the shareholders of the Company numbered 15,000, in addition to whom there were debenture stock holders and bondholders. Among the shareholders were barristers, solicitors, bankers, insurance directors, managers, underwriters, accountants, Members of Parliament, Ministers and ex-Ministers of the Crown, and men accustomed to business of every variety. Witness submitted it was hardly likely that a body of shareholders so composed would be content to entrust the management of their business to incompetents and incapables. With regard to capital, witness said that under the old system, which terminated on Dec. 31 last, the "A" ordinary stock amounted to £5,922,230, which must be multiplied by 2½ to get the present denominations of capital. Since the conversion, £100 had been split into £250 of stock. Witness handed in a schedule attached to one of the Company's Acts of Parliament, giving details of the capital of the Company as at present constituted.

Mr. Lough was proceeding to cross-examine witness on the points just spoken to by him, when

The Chairman called Mr. Lough to order; pointing out that the custom before Select Committees was to cross-examine the witness after the Chairman had examined him in chief.

Mr. Lough thereupon inquired whether, seeing how important this evidence was, there would be an opportunity of cross-examining the witness after his evidence had been printed.

The Chairman said that was not the usual course.

Some further conversation passed; and in the end the room was cleared, while the Committee deliberated in private. On the re-admission of the public,

The Chairman announced that the general desire of the Committee was that they should see the witness's evidence in print before entering on his cross-examination; and they would therefore request the witness to attend at the next sitting, in order to be cross-examined.

Witness (continuing) said the debenture stock of the Company was now £3,843,975, and the bonds £130,000. In addition to the class of shareholders referred to, a considerable amount of the Company's stock was held in trust for women and children; and he had no doubt the reason was that the stock was regarded as having a limited parliamentary guarantee—a statutory dividend based on a standard charge for gas.

The Chairman: Your capital altogether amounts to £21,642,992?

Witness: Plus the debentures. Much of the stock is held in trust; and I give as an explanation of this fact that they look upon it as a *quasi*-parliamentary stock—the dividend being regulated by the standard price and the price at which the gas is sold.

Therefore they think that the dividend is tolerably certain?—A stock in which they are not likely to lose the capital of those for whom they are acting. Most of the points raised by Mr. Livesey in his evidence before this Committee are contained in a speech which he made on Feb. 4, 1898, at our half-yearly meeting. At his request, his speech—the whole of the proceedings of the meeting—and our reply were printed and circulated to every shareholder of the Company, so that all had an opportunity of knowing what were the complaints which Mr. Livesey made against the management. I signed the reply (which I beg to put in), as Governor of the Company; and we received only two letters in answer to it. One accepted it in its entirety; and the other accepted it generally, but doubted rather the expediency of the abolition of the

meter-rents. It is not only on Feb. 4, 1898, but at almost every meeting for many years past, that Mr. Livesey has raised these questions, and criticized the management. He was, and is, I believe —I am not quite sure—a shareholder in the Company; and he attended in his capacity as shareholder, and made these criticisms. But he has never exercised his constitutional right of moving an amendment to the motion for the adoption of the report, or to the motion for the re-election of the retiring Directors. The retiring Directors have almost always been unanimously re-elected by the shareholders. I can only recall one exception, and that was of a colleague who was connected professionally with one of the earlier Electric Lighting Companies. His re-election was opposed; but the opposition was not persevered in, and he was ultimately re-appointed. Then another point raised by Mr. Livesey was as to the appointment of our General Manager. On the retirement of Mr. Phillips, the late General Manager, who had been Secretary of the Company for some 32 years, and during whose tenure of office the amalgamations which have been referred to were carried out, the Board unanimously elected Mr. Field to occupy his position. Mr. Livesey says he warned us against this appointment; he says we put a triangular man into a square hole. I have no knowledge of his warning; but if the warning had been received, it would have been disregarded. No other name was put before the Court; and they have every reason to be satisfied with the appointment made. Mr. Phillips strongly recommended the appointment. For the past six years, I have been in almost daily communication and joint action with the General Manager; and I am in a position to say that no more devoted or active or capable officer could possibly have been appointed. I can only attribute Mr. Livesey's strong antipathy to Mr. Field to the fact that Mr. Field successfully defended the interests of our Company in the Nine Elms case. I will not trouble the Committee—unless they wish it—with the history of this case. Mr. Livesey spoke in terms of great admiration of the late Mr. Phillips; but it is within my knowledge that during Mr. Phillips's lifetime Mr. Livesey exhibited the same hostility to him as he now shows towards Mr. Field. This hostility did not cease until Mr. Phillips retired from office. As regards the position of our Company in reference to the consumers, the Court have always considered that, under the system of the sliding-scale, coupled with the auction clauses, whatever was for the benefit of the consumer must *ex necessitate* also be for the benefit of the shareholder; and, of course, the converse is equally true. We have, therefore, taken every available means of cheapening the cost of production; and had the circumstances been the same in both Companies, I have no hesitation in saying that we should be selling gas at the same price, or even a lower price, than the South Metropolitan Company are doing to-day. It is due to circumstances over which neither the management nor the Court can have any control—that is to say, interest on capital and rates. In all other cases, I think the Committee will come to the conclusion that the Directors have not mismanaged the Company. I do not mean to say that they have mismanaged the capital and rates; for those are things outside their control. I do not mean to say that it is impossible we could have expended an excessive amount of capital—been unthrifty —that I leave to the general evidence. But apart from this point, I think Mr. Livesey himself says now that the question of interest on capital is a *chose jugée*. Apart from these two items, I contend that the management have not deserved the condemnation passed on them by Mr. Livesey. Naturally the consumers are not so thoroughly acquainted with the circumstances as this Committee will be. They cannot understand why there should be so large a difference in the price charged north and south of the Thames; and they do not recollect, as we do, that it is the same difference as existed in 1876 when the parliamentary settlement was come to—when we were last in Parliament. The price charged then by the South Metropolitan Company was 3s., and by our Company 3s. 9d. We have only gone back even now to that time. I understand Mr. Livesey also to say that we were not under the same inducement as his Company are to reduce the price. I cannot make out this statement at all, because the provisions of our Acts are identical. We benefit by a reduction in the same way as he does; and we suffer by raising the price in the same way as he does. So that the inducements appear to me to be the same. Another point I may mention with regard to mismanagement is this: Mr. Livesey made some remarks at one of our half-yearly meetings; and in describing our business I used the term that the Company was a *quasi*-Government department. At any rate, it was the subject of much sneering in the "JOURNAL OF GAS LIGHTING"—Mr. Livesey's organ—but in spite of that I upheld the appropriateness of the description. The gas industry in the Metropolis and round about is a state-regulated monopoly. Our financial action is regulated by the Auditor appointed by the Board of Trade; and no departure from the recognized financial system can be taken by the Board without the consent of the Government Auditor. Then with regard to purity, pressure, and illuminating power, all these are tested and controlled by the Municipal Authorities under severe legal penalties; and the laying of mains and interference with the roadways is carried out under the supervision of the Vestries. So that I contend it is impossible for us to be guilty of persistent mismanagement, as stated, without being checked and called to account by the Public Authorities. Apart from the charge brought by Mr. Livesey, which went to this mismanagement throughout, his charges had reference to the selection of inland sites for our works. Well, this matter may or may not be well founded. The sites were selected in the fiftieth year of King George III.—nearly a century ago. There is no one living now from whom we can ascertain what led them to select these sites. I do not wish to pose as a *laudator temporis acti;* but I am not prepared to censure my forefathers, before they had the experience which we now possess after so many years. I hope the Committee will pardon me for making the point clear. As a fact, we have followed a reverse policy. We have closed inland sites, and have now two waterside manufacturing stations—Beckton and Nine Elms.

Sir F. DIXON-HARTLAND: You have no inland ones?

Witness: Yes; but we have not opened any.

The CHAIRMAN: The point of your case, as I understand it, is that you have invested capital in these inland sites which you were compelled to give up, and move to Beckton?

Witness: Yes. Whatever it is worth, that is one of the reasons why our capital is what has been termed unwieldy.

Sir F. DIXON-HARTLAND: How many inland works did you move to Beckton?

Witness: The Horseferry Road, and those at Blackfriars, Brick Lane, and Curtain Road—four.

Sir F. DIXON-HARTLAND: Have you any idea what the cost was?

The CHAIRMAN: We have had it all. (To witness) Do you wish to say anything with regard to your relations with the Local Authorities?

Witness: No; I think not. We have not much to complain of. The Local Authorities do what they believe to be their duty; and we do what we believe to be ours.

But you have just stated that you have considerable supervision by the Local Authorities in various ways, and that you have not had complaints from them?—What I said was that if we had mismanaged the business, these public bodies—the Board of Trade, *qua* finance, and the Municipal Authorities, *qua* purity, pressure, and illuminating power—would have pulled us up. As a matter of fact, we have been fined a very few times within the last twenty years for deficiency in illuminating power.

Still, you wish the Committee to understand that on the whole these Local Authorities who have supervision of various kinds over you, have not complained of your action?—In regard to that portion of our action over which they have authority. Before I leave the question of the old stations—the inland stations—another charge of Mr. Livesey's was that faults had been committed at Beckton. Well, in the same way, neither the originator of Beckton, Mr. Evans, nor Mr. Wyatt, the Constructing Engineer, is now alive. The matters took place a long time ago, and evidence has been given by our Engineer on the subject; so that I do not propose to go into that. I should be very much gratified if the Committee, or some members of the Committee, could see their way to visit the works of the Company—especially the Beckton works, and also those of the South Metropolitan Company. They will then see the character of the works, particularly with regard to loading and unloading operations. Of course, I do not mean to contend for a moment—no one would—that the Court have never committed any mistakes or errors. We are none of us infallible—not even Mr. Livesey. In effect, Mr. Livesey has been what is commonly known as "nagging" us for so long a time that we have ceased to take him seriously. We have always followed his lead when we thought it advisable to do so—to give an instance, in the establishment of the slot-meter system, because we thought it was a good one.

Has he made any practical propositions to you?—The only proposition he had made was that we should act in concert with him and pool our residuals—act with outsiders; and generally he has made a complaint that we manage our own affairs without sufficient consideration for other Companies and outside interests.

Mr. COHEN: That was an instance in which you did not think it right to follow him?

Witness: I have made attempts to arrange matters with Mr. Livesey about coal and other things; but it has always ended in failure.

Mr. NICOL: Why?

Witness: Because Mr. Livesey is all take and no give. We prefer being responsible to our shareholders and to the Authorities, to dividing the responsibility with the Directors of any other Company.

Sir F. DIXON-HARTLAND: You spoke about pooling the residuals and other things. I suppose the object was that you should not compete—that you should put the residuals on the market together?

Witness: I presume that was so.

Did that apply to purchase of coal also?—No; he objected very strongly to the clause in our contract, of which I am the author, and which I copied from the Great Eastern Railway Company (of which I am a Director), which prevented the coalowners from making use of us to sell a very large quantity of coal, and then to reduce the price to our competitors. I think Mr. Livesey holds the opinion that this was rather a churlish thing to do, and that we might damage him by it. All I can say is that the object of the clause was not to damage any other Company, but simply to prevent our Company being exploited for the benefit of any other Company; so that if a lower price was granted to any other Company, it should not be cast in our teeth that we had made an improvident bargain.

You as the largest buyers act as a strong lever with the Companies to get a low price?—Yes; we believe that is so.

For how long do you make your contracts?—A year. We have been asked sometimes to extend it, and make a three years' contract; but, at any rate for some years past, we have made them for a year. The effect of this clause would be that if, after we had bought our great quantity of coal, the other large Metropolitan Companies, who make their contracts subsequent to us, got a lower price, we should have a rebate. That is my most favoured nation clause, to which Mr. Livesey takes so much exception. It was not put in with a view of injuring anybody, but to protect ourselves. The effect and the object of the clause was to keep a uniform price for gas companies generally. The Gaslight Company have been asked to co-operate with Mr. Livesey with regard to working arrangements. The latest instance was last autumn, when the South Metropolitan Company raised the rate of wages for their men. The Commercial and Gaslight Directors had a meeting, as they thought, to discuss the matter, and arrive at a joint decision; but when they came to confer with Mr. Livesey, he said he had made up his mind the notices should go out on the Saturday. Therefore there was no use discussing it, and we had to send out notices. Co-operation of this kind is hardly inviting. Then with regard to our employees and our relations with them, we have an army of about 12,500 men in the winter, and an average of 10,500 all the year round. They are paid at the same rates as obtain in other gas-works in London and the neighbourhood. The men have every advantage that we are able to afford them in the way of sick fund, pensions, holidays, recreation grounds, and buildings for winter evening entertainments. They have no Sunday work, under any circumstances, except stress of weather, such as heavy fogs, when now and then we have to call them into the retort-houses.

Do Mr. Livesey's men work on Sunday?—No. I am only stating the case with regard to our own Company. We have not adopted the profit-sharing system. Some people look upon it as a philanthropic fad—and I rather share the opinion, at any rate, as carried on by the South Metropolitan Company. We do not consider the system desirable in our case. Our men do not ask for it; and, as far as I know, it has never

been put in practice in any Gas Companies except the two of which Mr. Livesey is Chairman. We do not desire to treat our men as irresponsible children. We do not interfere with their surplus earnings, which fructify in their own pockets, instead of being invested in the Company. At the same time, I hope the Committee will believe me when I say I have no wish to judge the action of any other Company. We have a pension scheme which is very much on the lines of one in operation in the Great Eastern Railway Company. Then Mr. Livesey says we are under the domination of the Trades Unions. That is not the case. We consider that in a free country like this the men are at perfect liberty to join the Unions or to abstain from joining the Unions. We will not, as has been frequently suggested to us by Union officials, put any pressure on the men to induce them to join the Unions; neither will we hinder them from joining, if they so wish. We are always ready to discuss all questions as regards rates of pay and regulations—working rules—with our employees, but not with outsiders who are not in our employ, and who only represent the Union. The reason why I personally have always set my face against any official recognition of the Union, is simply because they have no corporate entity. They cannot make binding contracts. They cannot sue or be sued; and if they could, and a verdict was secured against them, it could not be enforced. Their accounts are not published and laid before Parliament as ours are. As soon as (if ever) they are legally enrolled and registered, we shall be ready to officially recognize them. We could not do otherwise. One last point Mr. Livesey hinted at was disloyalty among our staff. Mr. Livesey said "he would not speak more strongly than that there was not that loyalty and hearty co-operation there should be; but it was not the fault of the staff. He believed they had a staff of men as good as those of other Companies. They had a staff of men who would work heartily, but they wanted proper leaders; and until there was a change at the head, they could not expect an improvement in the prospects of the Company." This had not been in evidence before; and it is put in now, because I wish to defend the staff from the imputation. They feel very keenly the reflection on their honour.

Mr. Livesey said they had a staff of men who worked heartily, but they wanted proper leaders. Who were the leaders he was referring to?—Myself, I suppose.

Not the leaders of the men?—I should say not; it is rather cryptic.

He means the Board?—I take it he means the Board. There is no disloyalty.

You contend that your relationships with the men are on the whole good?—I do.

Mr. Lowles: Have you had any strike?

Witness: Not since 1872. Then we had a strike, and London was put on very short commons as regards gas. Mr. Livesey referred to certain sore points between himself and the Gaslight Company. One—and, in fact, Mr. Livesey's gravest allegation against the Company—is that we did not adopt a suggestion thrown out on his behalf at one of the Gaslight Company's meetings that the costs which were awarded to the Gaslight Company in the Nine Elms case, amounting to some £6000, should, as a tribute to Mr. Livesey's services to gas companies generally in connection with the South Metropolitan stokers' strike, be remitted. While recognizing the value of the services Mr. Livesey rendered, I felt such a course would be absolutely illegal, and that any shareholder might restrain us by injunction, as in the case of *Tomkinson v. South-Eastern Railway Company*, when the Company voted £1000 to the Imperial Institute. This nagging policy has been adopted by Mr. Livesey ever since—or rather till a few months ago, when, by the intervention of a mutual friend, we had a meeting, with explanations and discussions. The result of this was that the hatchet was supposed to be buried, though it appears to have been exhumed before this Committee. I now come to Mr. Livesey's suggested remedy. He says we ought to go to the shareholders and tell them frankly how we stand. We are to tell them in his words: "We are in a serious position, and we want your support and sympathy in helping us out of it." I say we could not use such exaggerated and, I call it, hysterical language. We are not in a serious position; we have a very valuable and increasing business. It does not increase at the same rate as the South Metropolitan; but it is an increasing business, and I have every reason to hope, with ordinary winter weather, we shall resume our customary increase. We have difficulties, no doubt, to contend with which they do not meet with on the other side of the river. But we could not go to our shareholders and, after asking them to subscribe capital on the faith of the Act of Parliament, the terms of which we quoted in the invitation to subscribe, request them to give up a large portion of their dividend and a consequential amount of the capital value of their stock. I do not hesitate to call the policy suggested one of repudiation; and personally I should scorn to adopt such a course. I would rather give up my life's work in the Company than go to the shareholders and put such a proposition before them. I do not see why our shareholders should incur a penalty of three millions of money, which they would if they were to adopt the suggestion, simply because the policy of the men whom they have selected as their Directors does not happen to meet with the approval of Mr. Livesey. He then advises that, if we do not ourselves go to the shareholders and ask them to allow us to confiscate their dividends, Parliament should coerce us into doing so by refusing our Bill except on those conditions. Well, our Bill is not to raise capital under the sliding-scale, but only to raise money by 3 per cent. debenture stock. If Parliament were to commit what, with the greatest respect, I should consider a breach of public faith, the result would be just the very opposite to that which Mr. Livesey expects. We should have to abandon our Bill, to contract our operations, and to at once stop the supply of gas by slot meters—which is a voluntary matter, and not carried on by compulsion of our Acts of Parliament—because we should not have the capital necessary to purchase them. This would inflict a great hardship on the consumers. We should have possibly to raise the price of gas, and lower the dividend, in order to make both ends meet. I think cheap gas is a most excellent and desirable thing; but it may be obtained at too great cost, and the end sought does not justify the means which are proposed by Mr. Livesey. Within the limits of our Acts of Parliament, we have done, and will do, everything that is possible to secure it; but we are not prepared to obtain capital on false pretences, even for the purpose of reducing the price of gas. I say we have endeavoured, and I contend that we have succeeded, in carrying on the Company's affairs, both in the spirit and in accordance with the strict letter of the laws which govern the partnership which was established by the sliding-scale and auction clause arrangements between consumers and shareholders. One thing they blame us for is not allowing discounts. There is no sanction whatever that I can find in our Acts for charging differential prices to our consumers, except in the case of public lighting. On the contrary, the tendency of our legislation is uniformly in favour of absolute equality of treatment between private consumers.

The Chairman: You contend you could not reduce the price of gas to 2s. 2d., and make your two ends meet?

Witness: No.

That is your statement?—That is my statement.

Under the circumstances of your Company, it could not be done?—Under the present legislation it would be impossible.

And pay the dividend to your shareholders?—That would mean cutting down the dividend—almost annihilating it. The Committee will see, by looking at the tables we have put in, that we have ranged in price from 3s. 9d. in 1876 to 2s. 6d. in 1888; and I have no doubt that history will repeat itself. As soon as we get more suitable weather, and a better price for residuals and cheaper coals—though that can hardly be hoped for at present—we shall be able to reduce the price of gas.

Have you any view to give to the Committee as to your reserve fund? It has been depleted to a considerable extent; is it your policy to keep it low?—It depends upon what is best for the consumer and shareholder at the time. When we depleted our reserve fund—which was only earning a small amount of money—we were enabled thereby to postpone the raising of the price of gas; so that consumer and shareholder used the reserve fund for the common benefit. I do not myself attach much importance to the reserve fund now that we have the sliding-scale and auction clauses. The dividend is fixed. Everything that goes forward is in aid of the dividend of the following year; and when the amount is sufficiently raised, it enables us to reduce the price of gas.

Is there any limit to the sum you can carry forward, and which you do not place to the reserve fund?—There is no fixed limit, I believe. In the case of the Ashton Company, it was laid down that gas companies were entitled to carry forward what is reasonable. There, again, comes in the public Auditor. He would not permit us to carry forward an excessive amount.

What could he do?—Refuse to sign the accounts.

Could he compel you to pay a higher dividend?—No; but he could say: "The amount is too large to put by—utilize it by reducing the price of gas."

Could he require you to do that?—He could make the suggestion; and a suggestion from such a quarter would be in the nature of a demand. If we reduced the price, our statutory dividend would be raised *per contra*.

Supposing you did not lower the price, what could you do with the money?—Invest it, or use it in our business. It could be employed in our business instead of calling up capital.

Would you be permitted to use it?—A certain amount of it we do use as floating capital.

Would the Auditor allow you to use profits out of the undertaking as floating capital?—I should say he would take the view which your questions indicate. He would say: "After you have made sufficient provision for your necessary floating capital, you must deal with the undivided balance in the way of reducing the price of gas."

I believe your policy has been to hold that the profits of the time are due to the shareholders of the time, and not to the shareholders of the future?—I hold a strong opinion that we have no right to treat the Company in the view only of the future shareholders. We have no right to starve the living tenant for the benefit of the remainder-man. The man who invests in our Company is entitled to the fair return that the law allows him during the time he holds his investment. If the circumstances of the Company become worse, he probably would sell out rather than wait until better times came. We are bound to take each reasonable period of time and deal with it.

There are no exact figures laid down for that operation?—I know of none.

You have in your statement handed in a paragraph to the effect that you wish to speak of the Company's relations with the Government?—This is as to the Auditor to whom I have referred.

The Chairman said he should be glad if witness would attend before the Committee on Friday for purposes of cross-examination.

Mr. J. W. Field *was then re-called.*

The Chairman: In your notes of evidence, you say: "The witness will refer to the personal feeling shown throughout the whole of Mr. Livesey's evidence, and will submit an explanation of it." I must say that to the Committee, so far as Mr. Livesey's evidence was concerned, no personal feeling was apparent. He may have had it; but, at any rate, it was not shown to us in the evidence he gave.

Witness said that after the evidence given by Colonel Makins it would be unnecessary for him to go into personal matters. Personally he was only too glad to be relieved from the disagreeable duty of discussing these matters. He (Mr. Field) would now go to the question of coal purchase. Whether in regard to an allegation of mismanagement or not, this question could only be decided in reference to the figures of the Company's accounts. No mere declaration on the part of Mr. Livesey that there had been mismanagement could be regarded as proof; nor could any statement on the part of himself (witness) be taken as a definite and conclusive reply. He would put in a table which would show the position of his Company and that of the South Metropolitan, and remind the Committee of the difficult conditions existing between the two undertakings as to the position of the stations and the illuminating power of the gas. [This table appears top of the next column.] He had been appointed in 1893, so that he had begun with the year which immediately preceded his period of management. In 1892, the gross cost per 1000 cubic feet was, in the case of his Company, 17·88d.; while in that of the South Metropolitan Company it was 16·11d., and of the Commercial Company 18·4d. There they would see at once the

Annual Increase or Decrease in Gross Cost of Coal per 1000 Cubic Feet for Each of the Three Metropolitan Gas Companies.

Year.	The Gaslight and Coke Company.		South Metropolitan Company.		Commercial Company.	
	Gross Cost per Thousand.	Increase or Decrease.	Gross Cost per Thousand.	Increase or Decrease.	Gross Cost per Thousand.	Increase or Decrease.
	d.	d.	d.	d.	d.	d.
1893	17·83		16 11		18·40	
1898	15·91	1·94*	14·05	2·06	16·35	2·05
1894	11·39	1·55	13·46	0·59	15·23	1·09
1895	14·67	0·28	13 42	0·04	15 61	0 35
1896	13·75	0·92	12·83	0·56	14 81	0·77
1897	13·61	0·11	13·00	0·14	14·87	0·06
1898	14·24	0 60	13·39	0·39	14·62	0·25†
1898 over 1893		3·64		2·72		3·78

* Figures in this character represent decreases.

† The reduction in the Commercial Company's cost of coal in 1894 is the result of a large increase in the quantity of carburetted water gas supplied as compared with 1897.

difference between his Company and the South Metropolitan as to the cost of coal. It was a difference of 1·7d. per 1000 cubic feet. He claimed that the difference between them was to be accounted for by their better illuminating power and the position of the stations. The Commercial Company's figures were a little above theirs; and he attributed this to the extra cost the former had to incur, as compared with his Company, in the carrying of coal. The Commercial Company had no works on the river, and the whole of their coal had to be taken up by barge. The increases and decreases in the succeeding years would be seen from the table. He had given these figures and details because he wanted the Committee to see how close the thing was year by year. During normal years, his Company had obtained a larger reduction in the cost of coal than the South Metropolitan Company, and a slightly larger one than the Commercial Company. It was only when they came to the abnormal year 1898, when the South Metropolitan Company alone were fortunate enough to purchase their coal before the South Wales coal strike, that it was found the Gaslight Company fell back at all. It would be seen that the increased price they paid in that year was 0·60d., against 0·39d. of the South Metropolitan and 0·25d. of the Commercial Company. He must explain why, in this bad year, the Commercial Company were able to reduce the cost of coal. They had adopted, as his Company had, a system of manufacturing carburetted water gas; and in view of the very high price which coal commanded, the use of this gas was largely extended. It was a cheaper way of making gas; but some people objected to the unlimited extension of the system. At present, his Company were dealing with it in narrow limits; and this accounted for the fact that the figures of the Commercial Company showed an advantage over those of the Gaslight Company and of the South Metropolitan Company. There had been a Commission presided over by Lord Belper to inquire into this carburetted water gas; and they had reported, he did not say against the use of the gas, but against an unlimited extension of the system. His Company imagined that before long the Government would take the matter up, and legislate upon it. Pending this legislation, his Company had thought that it would be unwise to unduly extend the manufacture.

The Chairman: Do you find it dangerous?

Witness: It is a red rag to a bull to say that to some people. There is no doubt there is some danger in it; but to what extent, I would rather you should gather from Lord Belper's report.

Sir F. Dixon-Hartland: You mix it with the other gas.

Witness: Yes.

In reply to further questions, witness said that the result of the table was to show that the Gaslight Company had reduced the cost of coal 3·64d., the South Metropolitan 2·72d., and the Commercial Company 3·78d. His contention, therefore, was that the Commercial Company had done best, that the Gaslight Company had done next best, and that the South Metropolitan Company came last. From the figures he had submitted, he contended that there was no justification for the charge of persistent incompetence brought by Mr. Livesey against his Company.

The Chairman: You say that the figures show that you have made your purchases of coal as economically as anyone?

Witness: Yes. We think we have done a little better; but we are quite satisfied if the Committee think we have done as well as the others.

The Chairman drew witness's attention to a statement made by Mr. Livesey with reference to the arrangement for the purchase of coal entered into by the Gaslight Company with their contractors. The statement was that if another Gas Company obtained a better price than the Gaslight Company, the contractor must lower his price to them.

Witness said these terms were put in so as to prevent a new contract being made during the year. With regard to the difference of cost of coal, he pointed out that the figures he had given included the extra cost of enriching. It was not a question of coal pure and simple.

The Chairman said he understood that.

Witness said that there were different classes and descriptions of coal. Some were more costly than others—9d. or 1s. a ton more—and his Company bought a larger proportion of these than the other Companies, as they thought they served their purpose better. Mr. Livesey had said something about what he alleged had taken place last spring. He had said that two if not three contractors had offered coal to him (witness), and that he had declined the offers and subsequently had had to pay a very much higher price than that at which it had been offered to him. This statement had been repeated to witness at a Board meeting in the month of June last. He had taken no notice of it at the time; but a day or two afterwards his attention was drawn to an article in an evening paper which said that Mr. Livesey, or one of his representatives, had had an interview with the paper, and had cited the witness's mode of dealing with the coal contractors as another instance of his foolish methods. The newspaper represented Mr. Livesey as saying that a contractor had gone to witness, and had said that he (the contractor) must have 6d. a ton extra. But the reply was: "Not a penny"—emphasized with a rap on the table—the result being that witness had had to go to someone else, and had had to pay 6d. a ton more than he would have had to pay the contractor in question. Witness had written to the Secretary of the South Metropolitan Company asking if he would be kind enough to give him the name of the contractor; and this gentleman had replied that he never could have said that witness had declined to give 6d. a ton more, because he did not know that such an offer had been made. "All I know is," said the writer, "that one of your Directors told me that you declined to make an advance." Witness had again written asking for the name of the contractor, because he did not recollect how he made the remark attributed to him; and the Secretary had replied that he could not give the name without asking the permission of the contractor, and moreover the matter was not of such importance to render it desirable to trouble further about it. Witness had replied that he was sorry the name could not be given; that he agreed that the matter was not of much importance; but that he regretted his correspondent had not thought of that before he had made his statement to Mr. Woodall. In reply, he received a letter saying that no statement of the kind had been made to Mr. Woodall. It was true that the Gaslight Company had bought coal at a higher price than the South Metropolitan Company; but the explanation of this was that the latter had bought before the South Wales coal strike, and his Company had bought after. He should like to point out, further, that Mr. Jones, one of the most astute men in the gas world, had done exactly what the Gaslight Company did. No one believed that the South Wales coal strike would ever take place—certainly no one believed it would last more than two or three days. The fact that the South Metropolitan Company happened to buy their coal at an earlier date, and the Gaslight Company had bought theirs at a later date, and that during the interval something had happened which had upset the market, was no justification for Mr. Livesey saying that the Gaslight Company were guilty of mismanagement. In 1895 or 1896, his Company had a contract with a coal owner; and though the coal turned out very good when they first made the arrangement, owing to a fault in the seam or something of that kind it became very bad—so bad that they had to decline to take any more of it. The contractor was a very honourable man; and he said that, rather than there should be any difference between them, he would put a certain amount of cannel in the coal he supplied them with. He did so. But the coal again went bad; and the Directors at last decided that they would have no more from that pit at all. They did not stop the supplies from the contractor; but they put such restrictions on him that, at the beginning of 1897, he had a considerable amount of arrears to deliver. When the contractor made an offer in February of last year, they did not discuss it at all, though he told them what he was prepared to do. A little later on, the contractor called on witness, and offered him a still lower price. Evidently there were signs then of a fall in the price of coal. Witness had told the contractor that they were not purchasing coal at the time, and that they could not deal with his offer. Then the coal strike came. His Company had no intention of buying any more of that contractor's coal; but, when the coal strike came, they had to procure it where they could, and pay the contractors what they asked for it. The contractor put his price up a shilling, or possibly more; and as the Company could not make up their quantity of coal, they had to buy some of this man at the enhanced price. This was the explanation of why the coal was not bought in the first instance, and why ultimately they were obliged to purchase it at a higher price.

The Chairman: You mean to say that between the time of the rejection of this man's coal and the period of your purchasing it at an increased price, there was a strike?

Witness: We acted on the best advice we could get. We do not proceed in these matters altogether on our own view; we get the advice of people in the coal trade. One of the leading men in the trade assured me that the strike would not last more than a week or ten days, if it happened at all.

In further examination, witness said that Mr. Livesey had not by any means had all the luck on his side. It was lucky for him that things turned out as they did last year; and if the Committee referred to previous years, they would find the difference in the price of coal between witness and Mr. Livesey on his (witness's) side to the extent on one occasion of 5d., on another of 10d., and on another of 3d. This showed that the time of year at which he made his contract, though it favoured him last year, did not always favour Mr. Livesey. The Governor had dealt very fully with the "fall" clause in their contract; therefore witness did not think he need trouble the Committee with anything on that head beyond this: Mr. Livesey had said that the effect of the clause had been to enhance the price of coal. Well, the clause was introduced in the spring of 1894. The contracts for 1894-5 were 10s. 3d. per ton, for 1895-6 9s. 5·3d., and for 1896-7 9s. 3·7d. The fall clause had nothing to do with the reduction in price; nor had it any effect in hardening the price against other buyers. In regard to coke, prior to 1893 the Company's coke was sold by arrangement between buyers and the Company—an arrangement made over a table. The buyers used to come to the Company, or the Company would go to the buyers; and so they would settle the price between them. But in 1893, the Directors thought that this was scarcely the way in which the purchase and sale of 300,000 or 400,000 tons of coke should be settled; and they decided to invite tenders with a view to bringing in a larger number of buyers.

Mr. Baldwin asked if formerly they sold through a contractor?

Witness said they sold to consumers as well as to buyers. In 1894—the first year following the new arrangement—Mr. Bevan offered him 13s. a ton for 15,000 tons of coke. When a man as long headed as Mr. Bevan came and offered them that, they were pretty well sure that he knew he was going to get his value out of them. Witness referred the offer to the Directors; and they instructed him to supply the full quantity asked for at 13s. 6d. Mr. Bevan was only too glad to get the coke and pay the price. He, of course, grumbled a bit; but all people grumbled when they were asked to pay a price they did not like. On June 25, witness had written to a large buyer telling him what he had done for Mr. Bevan, and offering a similar quantity of coke at the same

price. On the 3rd of July, a representative of that gentleman called, and agreed to buy that quantity at that price. In fact, he asked for more; but witness was unable to give it. Immediately after this, the Directors invited tenders for the remainder of the coke; and he might say that the party who had asked for more tendered with others for a further quantity of 30,000 tons at 13s. 6d. Witness had informed him that, owing to the large number of tenders, they could only let him have another 20,000 tons, instead of the 30,000 tons he wanted. Now, Mr. Livesey had used a very awkward word in regard to this; and he had used it more than once. He had said that the Gaslight Company had "exacted" this price. But when a gentleman came up to the office and offered 13s., and the Company got 13s. 6d., and when others tendered at that price, and asked for more than the Company could give them, he failed to see anything like exaction in the process. There was no good done by criticizing transactions of the kind in language of an irritating character. In 1894, the market fell considerably; and the Company were prepared to accept lower prices. Then came the dispute with the Alliance Cement Makers. In 1895, they invited tenders for 440,000 tons. The tenders came in at from 9s. to 10s. 6d. per ton. The cement makers who were free of the Alliance tendered at 10s. per ton; and the combined cement makers tendered for 250,000 tons at the low price of 9s. 6d. The Directors, having sold to the free cement makers 200,000 tons at 10s., and knowing that other buyers had to compete in the market generally with the cement people, did not think it fair that so low a price as 9s. 6d. should be accepted. Negotiations were carried on for two or three months. They knew that the cement makers wanted the coke, and that if they were left alone they would pay for it; but some time in December or January following, the Alliance Cement Makers bought from the South Metropolitan Company the coke that they could spare them at 10s. a ton—the price they had refused to give the Gaslight Company. They knew well enough that Beckton was a more convenient place for the cement makers to come to for their coke than the stations of the South Metropolitan Company. The value of the advantage of getting coke at Beckton instead of the stations of the South Metropolitan Company had been assessed at 2d. per ton; so the Gaslight and Coke Company thought that, if these people gave the South Metropolitan Company 10s. a ton for their coke, there was no reason why they should not pay them a little more. Mr. Livesey took up the matter; and to the astonishment of every one in the gas world, by letters in the public press and speeches, he told the combined cement makers, although the free makers were paying the price asked, that there was no reason why the Gaslight Company should not sell at 6d. a ton under the price at which they had sold to the free makers. The Alliance were much encouraged by the position that Mr. Livesey took up; and they got coke from the South Metropolitan Company and from other Companies. They were able to beat his Company, who had to sell at 9s. a ton, because meanwhile they had been holding coke and accumulating a stock of it. It was necessary for them to get rid of it. A few years ago, Mr. Livesey had a strike at his works; and he was eventually able to win the day. Witness would like to ask Mr. Livesey what he would have thought if, when he was severely pressed by his men, they had gone and urged the men who were standing loyal to him to throw down their tools and leave their work. It was not fair for an officer of one Company to act prejudicially to the interest of another. They had all felt that the action Mr. Livesey had taken on that occasion had been most regrettable.

The CHAIRMAN: What are you referring to?

Witness: To Mr. Livesey's action in connection with ourselves and the cement makers.

Mr. COHEN: Do I understand that the price he sold at was 10s., and that he complained that you did not sell at 9s. 6d.

Witness: Yes.

In further examination, witness said that the weakness of the position of his Company at the period was that they sold such a large proportion of their coke to one set of buyers. The events of 1895-96 showed them that they would have to make some alteration in this respect. In the following year, the price was put down to 8s. Well, Mr. Livesey's brother had written to witness on Sept. 30, 1896, saying that the Alliance Cement Manufacturers expected to get coke at 7s. 6d. Witness had taken that as an indication of what the market price was; and when he got 8s. a ton he thought that his Company were not doing badly in disposing of all their coke at that price. During the whole of the time they were trying to improve their position as to this monopoly question. At that date the most profitable outlet was for export. Trade increased, new markets were opened up, and the prices were more favourable. They sold 105,000 tons out of 471,000 tons, or a little more than one-third, for export. It put them in the position of being no longer dependent upon one class of buyer. The parties to a monopoly could put the prices down to what they liked; and this had been done in previous years. The Company had then said that they should not do it again.

Mr. LOWLES: Does Mr. Livesey export much?

Witness: He does export. [A VOICE: Not at all.] I have it on the authority of our own contractor that he exports 5000 tons of coke.

You yourselves have opened that market entirely?—We have done more for it than any other London Company; but I think some of the Southern Companies do it. Mr. Livesey gave a case—Plymouth.

The CHAIRMAN: Do you think upon the whole your plan of selling for export has lowered the price of coke?

Witness: No. I do not wish the Committee to think exporting has been our only fresh outlet. We have increased our sales to florists, who are very important customers. We sell to florists 20,000 to 40,000 tons a year.

I want to get at the point whether you are persuaded, in your own mind, you are acting wisely in encouraging the export of coke?—There is absolutely no doubt. Beckton is eminently fitted for the export trade. We have jetties there, and viaducts and railways; and we can do that work there more cheaply than the retail trade. In 1893, the cement makers paid us 11s. a ton for coke; the exporters 11s. 6d. In 1894, the cement makers paid 13s. 6d.; the exporters 14s. 3d.

Mr. COHEN: Does not the quantity come in; do you not sell more to the cement makers?

Witness: In those years we did.

And if you sell larger quantities, you expect to take a smaller price?—Yes.

That is a factor which affects the comparison?—Well, we are rather inclined to deal with all buyers as nearly as possible on the same level. I do not think we give any special advantage to the large buyer.

The CHAIRMAN: You get a better price from your export than from your home buyer?

Witness: Yes.

Mr. LOWLES: If you get a lower price, the fact of having another outlet would be an advantage?

Witness: Yes; it makes us safer. The Directors said they were determined never to be in the hands of any one class; and, above a certain minimum, 12s. 6d., whatever the offer from any of the buyers, they said an allotment should be made. In that way the Company retained their customers.

Then you have broken down combination?—Absolutely. We are freer to-day at Beckton that when we first went there 25 years ago.

The CHAIRMAN: Have you disposed of coke?

Witness: I must refer by way of refutation to an assertion of Mr. Livesey that the Company lost £80,000 in three years. That was in respect of coke contracts. Mr. Livesey did not attempt to support this figure by any evidence whatever, or any reference to figures or published accounts; and therefore all I can say is, that there is nothing whatever to justify it, and that the reduction in the income of the Company from coke during those periods is attributable to the ordinary fluctuations of trade. I find that in the years referred to, compared with 1893, we lost 27 per cent. in price; the South Metropolitan, 25 per cent.; and the Commercial, 36 per cent. Mr. Livesey's reply to that was: "It is all your doing; you ruined the market, and therefore we had to take very low prices." But I would draw the attention of the Committee to the fact that the Suburban Gas Companies show a similar reduction of 27 per cent.; and that the Provincial Corporations all over England show a corresponding reduction of something like 22 per cent. Therefore I think you can safely say the reductions in the price of coke had been rather the effect of the ordinary rule of trade than of any mismanagement or of any personal question whatever. There is one more matter in connection with coke, and that is Mr. Livesey's criticisms of what we did last year. Last July the Directors invited tenders for coke; and they fixed, for the first time, a minimum price. The reason was that one or two of the buyers came to me and said: "We wish the Directors would give us some idea of what their price is; we do not like our tenders being rejected, nor being cut down unduly in quantity. If the Directors could give us some idea of what they thought a minimum price, it would enable us to send in a tender more likely to be accepted." They fixed a minimum of 12s. 6d. a ton; and tenders came in varying from 12s. 6d. to 14s. 1d. The quantity tendered for in the aggregate amounted to three times more than the Company had to dispose of. The allied cement-makers sent in two tenders; one for the purchase of 252,000 tons at 13s. 7d., the second for the purchase of the whole quantity which the Company had for sale at 14s. 1d. So their invitation was that we should again place ourselves entirely in the hands of one set of buyers. However, the Directors had not forgotten the experience of former years, and they said: Although we may lose something by declining this tender of 14s. 1d. for the whole quantity, we will adhere to our principle of maintaining all classes of buyers and apportion to each class of buyers a share of the Company's business. They did this; giving to the allied cement makers a preferential quantity, by reason of the extra price they offered. Then the free cement makers had a certain proportion of the quantity they tendered for; the exporters, florists, and all others were treated in the same way. The man who bid the highest got a preferential quantity; the man who tendered lowest, a bare quantity.

Mr. COHEN: Then they did sell the article to different buyers at different prices?

Witness: Yes. They said: It is not fair for us, having invited tenders at a minimum price, to reject those who tender at our minimum price. But the way we will recoup ourselves is this: The man who bids the higher price shall get the larger quantity.

The CHAIRMAN: Did these tenderers at 14s. enter any protest against your selling at a lower price?

Witness: I do not know that it was a protest; but they expressed their surprise, which was very natural.

Mr. COHEN: Is that a new practice on the part of the Board? It sounds a little different from ordinary business experience?

Witness: Yes, it is a new departure; and I think the new departure is fully justified by our experience.

The CHAIRMAN: That is your practice?

Witness: That is and will be our practice.

You think it is right?—Undoubtedly. Now we come to another debateable point—tar products, especially as regards anthracene. Mr. Livesey has criticized here, in this room, and very freely elsewhere—in the public press and at general meetings—this Company's dealings in anthracene; but Mr. Livesey is talking of a matter of which he has no practical experience whatever. He has never made an ounce of anthracene to my knowledge. If he had had a little more practical experience, I do not think he would have been so free with his harsh language and general condemnation. It is quite true the Directors have always refused to enter into any combination in respect of products. We are constantly having suggestions made to us from coke and anthracene people and all sorts: "Can you not enter into some combination; cannot you agree as to a price under which you will not sell?" And the considered answer of the Directors is: "No; our business is to carry on our business in our own way, without restriction from any outside party." That is the principle they have laid down for some years now. It is quite true that anthracene, when we first commenced to make it 25 years ago, used to fetch 4s. 6d. a unit. A unit is the 640th part of a ton, I think. To-day's price is 4d.

Mr. COHEN: Fallen from 54d. to 4d.?

Witness: Yes, that is one of the most extraordinary falls that has taken place in any article produced.

Has it been steady?—Steady from the beginning. Owing to the enormous production on the one hand, and the substitution of other dyes, the price has steadily fallen down. In 1893, a certain number of the tar products manufacturers formed themselves into a combination. They were not satisfied with the market prices, especially as regards this question of anthracene. They thought, as a great many other men thought, that if they could only combine and hold stocks—buy up stocks and hold them—the buyers would be starved into paying a better price. It was the

old story of the Salt Union and the Cotton Union. They came to us in 1893 and asked whether we would join them—put the whole of our anthracene into their hands. They said: "It only remains for you to do this to be able to command from 2s. to 2s. 6d." It was then about 10d. to 11d. We said: "We do not want to stand in the way of anything you think can be done; but we cannot join in a combination." I had several interviews with the Chairman. I said: "We cannot keep off the market; is it worth while for you to buy our stuff yourself? If you buy a certain quantity, we will undertake not to put any more on the market at a lower price for a certain number of months." The result was that we arranged that they should buy a certain quantity of our anthracene at 14d. a unit; the condition being that for a certain time (four months, I think) we were not to sell at a lower price. The reason we got the higher price was that the Chairman said he thought the stuff was worth 14d. or more. I said: "If you want us to stand out of the market in order that you may get a higher price, it is only reasonable you should pay us some consideration for it." He saw the reason of that. This arrangement, and fresh arrangements of a similar kind, were carried on for 14 months.

In further examination, witness went on to state that there were fifty communications between the Company and the parties interested on the subject of anthracene, and all in the most friendly terms; so that there was no ground for Mr. Livesey's statement that the Gaslight Company did not work with them on friendly terms. Unless they could control the whole market, such an arrangement must fail; and the result was that some of the stuff bought from the Gaslight Company at 14d. had to be sold at considerably below that figure, and instead of maintaining the price it had steadily fallen. It was a good arrangement for the Gaslight Company, though witness did not know if it had any harmful effect on the market. The cause of the fall was over-production, and the competition of benzol and naphthalene. From both of these, very beautiful dyes were made; and they, to a large extent, had taken the place of anthracene. Witness thought it was very foolish indeed to talk publicly about prices and the possibilities of the market; the least said the better on such subjects. But as Mr. Livesey had raised the question, witness must tell the Committee that even at 4d. The Gaslight and Coke Company made a profit. Mr. Livesey was interested in this, although he made no anthracene; because the better the price of anthracene, the better the price of tar. Mr. Livesey was not aware that, although this Tar Products Sales Committee were backed up by some very influential men indeed, the most important man in the trade—a member of it—declined to put the whole of his stuff into it; so evidently he did not think very much of the prospect. The present price of 4d. per unit was for a higher quality of anthracene than that which formerly fetched 4s. 6d. When they commenced working up their own tar products, the Company worked in the ordinary way. But they soon found that, by a better process, they were able to get more anthracene out of a gallon of tar; and no doubt others did the same. So that while the quantity of anthracene produced per gallon of tar had increased, on the other hand, products, such as naphthalene and benzol, came in to increase the competition. Then they were very forcibly told by Mr. Livesey that they should sell as they made. But the buyers—Germans—were few; and they would buy just when, and just what quantity, they pleased. If the Company were to say they would sell the anthracene as it was made, they would have to sell to the dealers who would first of all reap a profit, and, what was worse, would have this large stock in hand to negotiate on the market. The Company held that it was better to wait till the natural consumers wanted the stuff, and to deal with them direct. The Company had been attacked again and again on the ground that their system of selling was bad; but the same system had been applied to creosote, carbolic acid, benzol, oil, and pitch, which the Company made, as well as to anthracene. If the Gaslight Company's system were bad all round, the same bad effect would be noticeable in every case; but they found that creosote, which in 1879 fetched only 0·2d. per gallon of tar distilled, in 1898 went up to 0·68d.—three times as much. Carbolic acid realized 0·06d. in the earlier year, and was now 0·32d. Benzols and naphthas, on the other hand, realized 0·38d. in 1879, and only 0·18d. in 1898. This latter decrease was due to the enhanced production of the articles by the owners of coke-ovens. Green oil also had fallen in the same period from 0·55d. to 0·26d.; while pitch had risen from 0·6d. to 1·08d. If the Company's system were wrong, the loss would apply to all products.

Mr. COHEN: It does not apply to all; but do you contend that, taking all the products, the net result is that your system is on the whole a good one?

Witness replied in the affirmative. He said the variations in price were not the result of the Company's operations, but were the ups and downs of the market due to market demands and market supplies. Mr. Livesey said that the Company forced anthracene on the market when nobody wanted it, and that their policy was that of holding.

Mr. COHEN: And that holding was bad?

Witness: I say we do not hold.

But you agree if you did it would be bad?—Yes. If you will refer to page 33 of the "Reply," you will see how wholly inconsistent Mr. Livesey is. He says—

"There is, I am assured, no reason whatever but one why anthracene should not be sold at the present time at 2s. 6d. per unit, or more. It is only necessary for half-a-dozen of the leading tar distillers to agree to have a higher price, and it can be obtained; and all but one"—that is The Gaslight and Coke Company—"are ready to bring about such agreement, when the price could go up at once. For instance, instead of putting or forcing it upon the market, could not the makers, by common consent, wait for buyers to come to them? Or, if this is not advisable or practicable (though no difficulty is apparent), could they not sell it by tender?"

The suggestion there was that they ought not to force the stuff on the market when it is not wanted?—That is right in principle; but it is at variance with what he said the other day.

Mr. BALDWIN: The idea is to corner the consumer?

Witness: Yes. In 1892, he wrote a letter to the "JOURNAL OF GAS LIGHTING," in which he said—

I was informed that the stock of anthracene in the hands of tar distillers in this country is very low. I now, however, hear that practically the only stock of any importance is that held by the Chartered Company; and the fear is that that Company will again force a sale of their stock on an unwilling market, with the result of further depressing the price. I said to my informant: "But what would you have the Chartered do?" His reply was prompt, to the effect that the tar distillers would be quite willing to carry the stock jointly with the Company until the market is ready to receive it.

If that is not cornering, I do not know what is.

The charge that you endeavoured to overstand the market is not true?—No. It is quite true that anthracene is not a material you can put on the market and sell when you like; but we have not overstayed our market. The market has been a falling one for the last 20 years, as I have said. And now to pass to ammonia. Mr. Livesey said in his statement that in 1894 we stood out for £14 a ton. Sulphate, also, in the early days, used to fetch a good price. We used to get from £20 to £21 a ton for it. But the make has been largely increased by new manufacturers. Up to 1880, gas-works used to be the sole producers of sulphate of ammonia; but according to published returns, we find in 1886 that iron-works, shale oil works, and coke-ovens began to throw large quantities on the market. And whereas in 1886 the proportion of sulphate of ammonia made at other than gas-works was something like a fourth of the whole quantity manufactured, in 1898, out of 205,000 tons of the stuff made, 70,000 tons, or one-third, was made by these outside manufacturers. Then there was the competition introduced during the past 10 years that did not exist to any appreciable extent before that time. Then Mr. Livesey says we stood out for £14 a ton, which the market would not bear. I am glad to say that the market did bear it. The fact is that from the beginning of January, 1893, the price rose regularly month by month, until in June, 1894, we realized on more than one occasion £14 a ton.

Mr. COHEN: You got that for all you wanted to sell?

Witness: For all we had to sell. We had a slightly higher stock in 1894 than in the corresponding period of 1895.

You got rid of what you wanted to sell?—Yes; and it was not until later in the year that we found any difficulty in selling it. It is not only that during the period we are discussing the price went down, but for a reason we could not understand at the time, there were no buyers. It was not altogether a question of price. People would not buy. Under such circumstances, if you force the market you force the stuff into the hands of middlemen; and middlemen destroy every market they have to do with. The policy we have adopted therefore is, wherever we can, to sell to the consumers or their agents. During the following months we were slack. From June to September we, in common with other producers, were unable to sell. But in September we accepted the market price of £13 a ton. We were still unable to sell; and it was not until December of the same year that we were able to effect a sale, and then it was at £11 a ton. I do not attempt to persuade the Committee to believe that if we had accepted a lower price in the earlier months we should not have got it; but we did not think there was any justification for the large depreciation in the market value which took place in the autumn of that year. During the whole of that year, I was in communication with Mr. Jones of the Commercial Company, who adopted the same policy that we did. He used strong language as to the price and the destroying of the market; and he, like ourselves, accumulated what was for him a considerable stock. The price of £11 which we realized in December we sold at regularly up to February, 1895; and then we found it difficult to sell at all. It was not until July, 1895, that we were able to put any appreciable quantity on the market; and from July we sold at an average price of £9 5s. This has been a matter of considerable soreness.

Mr. NICOL: In 1896 it fell to £7 a ton, Mr. Livesey says?

Witness: I cannot find the figure for that year. For the next six months we realized £8 5s. a ton; and our sales for the following six months realized £7 10s. or a little more—that would be during the first six months of 1896.

That is not much different to the price Mr. Livesey gave?—In the spring of 1895, the buyers of the liquor from the South Metropolitan Company came to me and offered terms, or suggested to me that we should enter into a combination with them with a view to keeping up the price of sulphate of ammonia. When the market is going down, people think they can keep it up by combination. That is the old cry; but it is a mistake. During the whole of 1897 we were able to sell on a rising market; so that in 1898 the price touched £10 a ton. The average figures we have realized year by year during the whole period since 1893 have been as follows: 1893, £11 0s. 4d.; 1894, £12 15s. 7d.; 1895, £10 4s. 6d.; 1896, £8 5s. 5d; 1897, £7 11s. 2d; 1898, £8 16s. 7d. Therefore, if you take the period 1894 to 1898, we realized an average price of £9 1s. 4d.

The CHAIRMAN: Did any of the other Companies get a better price than you?

Witness: No.

Mr. NICOL: The general charge against you by Mr. Livesey about holding up this stock, you say is not true?

Witness: Yes. We had to hold stock. We could not sell.

What answer have you to make to the statement as to your holding?—We were obliged to hold stock. We do not deny that.

You say that stocks accumulated in October, 1894; and that you held at £13 a ton?—Yes, we did what we were obliged to do; and those of us who passed through 1894, 1895, and 1896 know that it was about the most anxious time to everyone connected with the sulphate of ammonia market. The reason of the fall which then occurred, I do not think has ever been explained. For the first time within record, the consumption of sulphate of ammonia in the year 1893 fell off; and that falling off was concurrent with a very large increase in the production. In the following year, the shipments of sulphate of ammonia fell off also for the first time, to the extent of nearly 10,000 tons. The home consumption did not recover for two or three years after that. The consumers could not use the stuff. The agriculturists in England passed through about the worst time they ever did have to pass through. They had no money to spend on high-class fertilizers; and the sugar industry, in which sulphate of ammonia is largely used, was about as bad as it could be. But the stagnation worked its own remedy, so far as sulphate of ammonia was concerned. We were obliged to make the stuff—it is a residual product; and you cannot stop manufacture in a gas factory.

The CHAIRMAN: You say you have an increased production of the chemical every year?

Witness: Yes. In 1891 we made 143,000 tons, in 1892 149,000 tons, in 1893 152,000 tons, and in 1894 (which was a bad year) 160,000 tons.

We were increasing the production with our increased manufacture of gas; and at the same time the consumption of sulphate was decreasing. But as I was saying, it worked its own cure. When the price came down to £7 10s. a ton, the agriculturist who had been using nitrate of soda came into the market and bought this stuff, and liked it; and now there is a prospect of its commanding higher prices if more nitrate does not come to us. The fall in prices has not been an unmixed evil. It has brought us in a larger body of buyers; and, as in the case of coke, the market is stronger now than it has been for years past.

Are you going to put in a comparison between your operations and those of other Companies?—Yes; when I come to deal with the net result in regard to the cost of coal. For the net result now, deducting from the cost of coal the value of the several residuals—coke, tar, sulphate of ammonia, and so forth—it is interesting to find that from 1892 to 1898 we have so improved in further reduction of the price of coal relatively to the other Companies. Our reduction has been 3·17d., as against a corresponding reduction in the case of the South Metropolitan of 1·68d., and of the Commercial of 1·80d. We have gained in the gross cost of coal, having bought cheaper; and we have gained in having a larger return for our residual products per 1000 cubic feet than the other Companies. The net result is as I have stated. In buying coal and in selling products, we have done better than the other Companies. With regard to Mr. Livesey's figures as to capital, I do not intend to go fully into them, as I have threshed the matter out in dealing with the evidence of previous witnesses. Like the Governor, I am not going to spend time in discussing why our forefathers selected Horseferry Road as a site for their works. The history of the Company was fully gone into in 1868 and 1876. Mr. Livesey has handed in a statement showing the increase in capital and increase in business; and I am at a loss to understand the principle on which it is carried out. He has dealt with varying periods in the cases of the different Companies, and has not compared like with like. The years he has taken have been from 1868 to 1898 for the Gaslight Company, 1879 to 1898 in the case of the South Metropolitan Company, and 1875 to 1898 in the case of the Commercial Company.

In further examination, witness said that during the period 1869-79, Mr. Livesey excluded from his table 9·7 per cent. of the increase of the South Metropolitan Company, and also the capital expenditure, during a normal period, when his expenses amounted to £420 per million. He also excluded the Commercial Company's figures for almost a similar period, when their expenditure amounted to £62 per million. Witness had protested more than once against the selection of periods and dates. To make a fair selection, let them take one period and apply it to all the Companies; but this selection of years, and taking out of figures, was not according to his idea of fairness. If the tables were corrected for all these things, a very different result was obtained from that exhibited by Mr. Livesey. Taking the period of 29 years, selected by Mr. Livesey in the case of The Gaslight and Coke Company, and making a comparison with the figures of the other Companies for the same period, showed that the capital employed by The Gaslight and Coke Company per million during that period was £499, which included the expense of constructing Beckton (against Mr. Livesey's £520). The South Metropolitan corresponding figure was altered from £348 to £355; while that of the Commercial Company was reduced from £356 to £318—which was all to the advantage of the Commercial. Coming to examine the figures of the Gaslight Company, witness found some funny things. For purposes of his own, Mr. Livesey added to the capital expenditure of that Company between 1883 and 1890 £42,000; and, not content with this, in the following year he clapped on £200,000—making the capital expenditure per million for the period 1890-98, £796. This £796 Mr. Livesey had quoted again and again; but the real figure was £714. Why he added the £200,000, witness had not the remotest idea.

The Chairman: You mean his figures are wrong?

Witness: Wrong; and therefore his comparison is wrong, and the deduction he draws from it is wrong. I will not notice, because really it is a most unworthy thing, the addition which Mr. Livesey has made of £400,000. Just under our figures in the table, in a note, he says: "Including £400,000 out of these amounts as spent on Beckton, the rate per million sold will be increased from £520 to £554 on the 29 years." He is not content with adding on this £240,000 for actual expenditure; but he says: "Oh, you spent that sum in some anterior years. I will add that on too"—what in the world for, I do not know.

Examination continued: Mr. Livesey worked out the percentage of increase in some extraordinary way, making the figure of the Gaslight Company for the 29 years 180 per cent. Then he gave the figure of the South Metropolitan Company for 19 years as 160 per cent. But witness held that the latter figure should be altered to 380 per cent. for 29 years. Witness adhered altogether to his original statement as to the capital of the three Companies, since 1876. Mr. Livesey gave the average rate of interest on capital of the South Metropolitan as 3¼ per cent., and in the case of The Gaslight and Coke Company as 3⅜ per cent. The proposal of the latter Company in their Bill before Parliament was to raise all their capital at 3 per cent.; and that he hoped would bring down the average rate materially.

The Committee here adjourned.

Friday, June 30.

Colonel Makins *was recalled for cross-examination.*

He referred, in opening, to a statement he had made that there was only one of his colleagues on the Board of the Company who had no experience, as far as he knew, in the directorship of Gas Companies. He was mistaken. The gentleman he referred to was, or had been, Chairman of the Brighton Company, and had had further experience; so that, for what it was worth, this strengthened his argument as to the presumed competence of the Board. Then he had said the total number of proprietors was 15,000. The actual number was 14,932. There were 11,451 holders of ordinary stock, 3590 holders of preference stock, and 2142 holders of what they called maximum stock. These three figures totalled about 2000 more than he mentioned. This was accounted for by a number of double holdings. As regarded loan capital, there were 2517 holders of debenture stock, and 368 holders of bonds. As to the general charge of incompetence and mismanagement, witness alluded to opinions expressed by Mr. Livesey on two occasions at meetings of the Company. On Feb. 7, 1896, he said the Company had a splendid lot of officers, who would compare with any others in the world; and on Feb. 4, 1898, he almost repeated himself, by saying he believed they had a staff of men as good as those of any other Gas Company.

Mr. Lough: I notice you said, at the end of your evidence, that you do not recognize you are in a serious position—that is, The Gaslight and Coke Company?

Witness: Yes.

Although your charge is 10d. more to the people in the north of London than in the south?—I do not deny that. A penny per 1000 cubic feet in our district represents roughly about £80,000.

So that 10d. represents a tax of £800,000 a year on the people in the north of London?—I cannot accept the definition of a tax. The price paid for a commodity is hardly a tax.

If they got the commodity at 10d. per 1000 cubic feet less, as the people do in the south, they would be £800,000 better off—I am speaking of the district in the north?—If the people in the north had their gas charges reduced by 10d., they would be the amount which you have stated better off—they would get their gas to that extent cheaper.

If the people in the north of London received their gas at the same price as the people in the south of London do, it would be equal to a remission of £800,000 a year in taxes?—I will accept that.

Do you not think that is a serious position?—I do not think so, because it is exactly the same position as we occupied (though it was not then £80,000) in 1876. The price in the south then was 3s., and in our district 3s. 9d.

That merely amounts to this—you were nearly as badly off?—Twenty-five years ago our relative positions were nearly the same.

Then you have effected no improvement?—Oh, yes; we have effected a good deal of improvement.

You are not relatively better?—Not at this moment; but we have been. We went down in price from 3s. 9d. to 2s. 6d.

And now you have got up to 3s.?—Yes.

At the moment you are a Company worse than you were 25 years ago?—No; practically we are very nearly on a parity.

Then you have made no improvement?—We have made improvement; but we have lost that improvement in the last few years.

You say at the end of your evidence: "We can only pay a statutory dividend." In your annual report I read: "The Directors recommend a dividend at the statutory rate of £12 5s.?"—Yes.

What is the meaning of statutory rate?—It is the rate which is governed by the price for the time being which, under the statute, we are permitted to pay.

But you are not obliged to pay it?—No.

There is no statute compelling you to pay £12 5s.?—No; but there is no statute compelling us to reduce the price.

I would rather you separated the two?—The two are inseparable in my mind.

You admit that there is no statutory obligation on you to pay 12½ per cent.?—No.

Do you not think you ought to drop out the statutory rate from your report, and from your evidence?—No; I should very much object. It maintains, and keeps before the public, the fact that price and dividend are relative.

Can you show me anything in any of your Acts where 12½ per cent. is made obligatory on you?—No.

You admit the expression is a serious one?—I think it is a justifiable expression.

At any rate, it is a serious statement made to the public to get money out of them?—I say the public perfectly understand it.

Is there anything about 12 per cent. or over 10 per cent. in any statute?—There is the sliding-scale clause, under which the standard dividend was put at 10 per cent. when the price was 3s. 9d., and that every increase or decrease of 1d. entitled us to an increase or decrease of dividend of ¼ per cent. This was before the conversion. Now the figure of increase or decrease is 2s. per cent.

Is not the dividend only permissive? There is nothing that obliges you to pay 10 per cent.?—No; if we thought it desirable and just and equitable to pay a less dividend and carry something forward, we could do so.

Then there is nothing in the statute which obliges you to pay 10 per cent.?—No; I have never stated we were obliged to pay it.

You admit that the dividend is purely permissive, and that there is nothing in your Act to prevent your paying 8 or 10 per cent.?—I say the Act indicates what the dividend should be under ordinary circumstances in relation to price. It indicates what the shareholders may expect.

Do you think the shareholders as possible investors are familiar with all the technicalities of all the Acts of Parliament?—We endeavour to make it as clear to them as possible. When we apply to the public for subscriptions to capital, we set out all the clauses of the Acts which deal with dividends.

Do you not think the public invest rather on what you have paid in the past?—I really cannot say what influences the public. I think you must put the public in the witness-box.

You are really in the position of any ordinary business?—No; we are a State-regulated monopoly.

You say you would rather give up your life's work than go to the shareholders and put such a proposal before them—that is, the proposal to pay less dividend?—Yes; the proposal which I said I would sooner retire than adopt or put before my shareholders, was the suggestion of Mr. Livesey that we should knock off 18s., or 2½ per cent. I hold that paying a lower dividend would be a policy of repudiation.

What is a policy of repudiation?—The policy of having invited capital on the basis of the Act of Parliament, and then straining those Acts of Parliament against the proprietors—and at the same time without any benefit necessarily to the consumers.

For instance, if you thought well to pay a dividend of 10 per cent. and reduce the price?—I say that would be a distinct injury to the shareholders and a distinct injury to the consumers, because we could never go to the public on the faith of our Acts of Parliament; and therefore the premium would be so much less. The premiums bear no dividend; and therefore the greater the premiums obtained, the greater the benefit to the consumers. Repudiation is going back from any obligation—whether implied or direct. I mean implied by the form of the tender.

When we ask for capital, and say our price is so much, and that the Company work under the sliding-scale, those who subscribe for the capital are led to expect, and would be unjustly treated if they did not get, the equivalent dividend for the price for the time being charged. One per cent. represents about £60,000.

Suppose you paid 1 per cent. less, what would be the effect?—First of all, it would reduce the income of the shareholders; secondly, it would knock down the price of his investment; and, thirdly, it would reduce the credit of the Company when they went for capital again.

Would it not have some other effect? Suppose you put the £60,000 to reserve, would that diminish the credit of the Company?—No; but it would not benefit the consumer. I do not see the use of putting it to the reserve.

As a matter of fact, have you not paid away the reserve fund which you got from the last two Companies with whom you amalgamated—paid it away in dividend?—No; the reserve fund has been divided between the shareholders and the consumers. The loss amounted to £759,000; and it was divided among the consumers to the extent of £635,000, and the shareholders to the extent of £124,000. If instead of using up the reserve fund we had left it intact, and raised the price of gas and lowered the dividend, I do not suppose either the consumer or shareholder would have approved.

Why not? You would have maintained your reserve?—A reserve fund which is earning about 2 per cent. cannot be a good thing for the partner. We are absolute partners—the consumers and the shareholders—and to have a large sum of money like that locked up, earning 2 or 2½ per cent., instead of being used in the business for staving off a raising of price, cannot be a benefit to the consumers or shareholders.

According to a balance-sheet I have, the Gaslight Company at a certain date owed their tradesmen various accounts. Would it not have been well to have paid those debts?—They were only the ordinary trade accounts; and at the same time there was £975,000 owing to the Company.

Do you not think it would be useful to be able to pay those debts?—No.

Would you not get advantages if you paid cash?—No; coal purchases are always carried on on the same principle, giving the same amount of credit.

Then you had a temporary loan of £450,000?—Yes.

How much do you pay the bankers?—The ordinary charges—the bank-rate.

That was 4 per cent. last year and 3 per cent. now?—It varies.

Would it not be an advantage to have money, and not to borrow this?—I do not think so.

You say that if you lowered the price of gas your statutory dividend would be increased?—Yes; increasable.

But you could lower the price without increasing the dividend if you liked;—Yes; but that would not be maintaining the parliamentary bargain.

You told us the *personnel* of your Board, the positions they occupy, and the standing of the shareholders. Do you not think that is irrelevant to the charges of mismanagement?—No; if we were guilty of mismanagement, and so incompetent and incapable as the charge implies, surely men of the knowledge and capacity of the class of shareholders I quoted would have found it out long since and turned us out as incompetent and incapable men to conduct their affairs. It does not afford any positive proof; but it affords very strong presumption that there is nothing very badly managed, otherwise the Directors would have been called to account. I have presided at over thirty meetings of the Company. The report has always been unanimously adopted, and we have always received the thanks of the shareholders.

In this respect you are in the position of any ordinary trading company—that it would be desirable to have some simple and effective management of your Company, and not to rely on the high social position of your Directors and shareholders?—I do not understand the drift of the question. I have not used the term social position; nor do I rely on it. I mentioned the *personnel* of the shareholders to show they are not a set of stupid avaricious men, who simply grabbed their dividends and cared for nothing else. By saying the Court of Directors have no control over the capital and rates, I meant the old obsolete capital charges which remained on the Company, and which the Court have no authority over. I do not think existing shareholders are called upon to sacrifice a portion of their dividend to wipe out obsolete capital for the benefit of shareholders to come hereafter. We are not in a bad position with regard to capital. We have simply spent what has been authorized on works, and are now applying to Parliament for more. We have a suspense account in connection with the slot meters, and are wiping it off every year. This is a policy approved by the Board of Trade.

There is nothing in the parliamentary bargain which prevents you carrying on your business in the regular way—building up a reserve if you like, and keeping enough money in hand if you like?—In our case we have power to put a certain amount of undivided profit to our reserve if we think fit; but this undivided profit belongs to the consumer and to the shareholder. The balance carried forward from year to year is not lost but gone before.

I am asking you whether there is anything in the Acts or Board of Trade Regulations which would prevent you keeping money in the Company in the shape of reserve, and keeping enough capital in your business, instead of paying it away in dividends?—If we adopted that policy I do not suppose the Board of Trade would interfere.

Mr. Banbury: Did you pay capital in dividends—that is the question.

Witness: No; I understand the policy which is pointed at is the building up of a reserve out of revenue.

Mr. Lough: You did pay in 1898 in dividend more than you earned in that year?

Witness: I will take it that we did.

Was not that paying dividend out of capital?—No; out of balances carried forward—undivided profits.

Then you have paid away both your balance carried forward and your reserve fund in dividend?—Not the whole of it; and I am in hopes it will be bigger this time. You will see from the analysis that the amount of surplus at the end of last year was £53,000.

But you have both diminished your balance and your reserve fund to pay these dividends?—Yes. A reserve fund is a fund to apply to to make up dividends, and, when it has arrived at a sufficiently large amount, to reduce the price of gas.

In view of the competition of the electric light, do you not think might be judicious for you to reduce your price, even at the expense dividend?—No; and moreover I do not think it would be just to the existing shareholders.

We need not go into that. Are you not in the position of a trading company who are charging too high a price for their goods, and taking too much profit?—No.

You are taking 12¾ per cent.?—Yes. Well, now it is £4 18s. per cent.

You might take 10 per cent. if you wished?—Yes; and the result of that would be ——

There is nothing to prevent that; and it would enable you to reduce the price of gas 2d.?—If we were to take £160,000, it would.

Might it not be judicious, in view of retaining your connection as it were, and opposing and giving better value against the electric light, to take this price?—If we were mere speculators it might be a good thing. We are a trading Company, but trading under special legislation.

But special legislation does not go so far as to justify you in charging too high a price?—I say we are absolutely justified by legislation in following the rules of the sliding-scale; and we have done that.

Can you mention to me any other large gas company approachable to you charging anything like 3s.?—There is not another company approachable to our own. There has been a list of Gas Companies handed in. I think there are some equally high.

I think Dublin is equally high. There are none in Great Britain charging so high?—I cannot say. I am under the impression there are others charging the same price.

Can you mention one?—You have mentioned one—Dublin.

There is no coal in Ireland. Now, you will excuse my putting it, but I think the spirit of your Company comes from you?—Oh, no; I must deny that. Mine is not a one-man Company.

Mr. Field is only a seven years' Manager?—Mr. Field has been in the service of the Company for some thirty years. He succeeded Mr. Phillips as Secretary and General Manager about seven years ago. I have been a Director of the Company since 1872, and Governor since 1883.

I am not putting it too highly in saying that the spirit in which the undertaking is conducted proceeds from you?—All I should say is that if I found the general policy I approved of was not acceptable to my colleagues, I should tender my resignation.

You occupy the same position to it that Mr. Livesey does to the South Metropolitan?—No; I think Mr. Livesey is a far more able man than I am, and has far more experience. And I do not think he will dispute when I say he takes a far larger share of the responsibility and general management of his Company than any other Chairman I know of any Company.

You said the Company was a *quasi*-Government Department. Is that true?—Yes; I say that is not an inappropriate comparison.

Further examined: He disagreed with the suggestion that the Company was an ordinary business concern; he could not see that a State regulated monopoly was like an ordinary company. He maintained that the Company were quite entitled to charge the full rate allowed under their Act. There was no gas competition with his Company. The electric light was competing more with the Company every day. Pressed as to whether it might not be worth while, in order to meet electric light competition better, to reduce the price of gas, witness said the sacrifice of a part of their dividend would enable them to lower the price; but they would have to sacrifice so much before they made any impression on the price of gas. Witness went on to defend the special clause which was inserted in the coal contracts at his instance.

Mr. Lough: Practically you are the inventor of it?

Witness: No; most favoured nation clauses are known in public treaties.

You say the object of it was not to damage any other Company?—Certainly not.

Was not the object to make another Company under certain circumstances pay more than they might otherwise pay?—No; the object was that if another Company paid less, we should have the same benefit.

Is not the effect of it to make the other Company pay more?—I do not know; it may or may not be. It depends entirely on the supply of coal in the market. I suppose the Gaslight Company are the largest buyers of coal of the Metropolitan Companies.

Questioned as to whether the clause did not mean that, if at the end of the year coal had fallen in price the contractor could only sell it at a reduced price to, say, the South Metropolitan or Commercial Companies by making a rebate to the Gaslight Company, witness replied that he did not see why the Gaslight Company should pull the chestnuts out of the fire for them. The clause only put the Companies on a level. If the Gaslight Company's contractors sold to the other two Metropolitan Gas Companies at a lower price than the Gaslight Company were paying under their contract, they would have to give the latter Company a rebate. His object was to get a uniform price for coal. He agreed that after the contracts had been made, the price of coal might, owing to different circumstances, be reduced.

Mr. Lough: If it is reduced, do you think it is fair to deprive them of the benefit of that?

Witness: I suggested to Mr. Livesey that he should make his coal contracts at the same time as we did. The Company are bound to protect themselves; that is why the clause was inserted.

The cause of the existence of this Committee is that you are charging 10d. per 1000 cubic feet more in the north of London than in the south?—Well, I have heard it said, in this room I think, that this is a Committee of inquiry into the management of The Gaslight and Coke Company.

Do you live in the north?—I live in the north.

Do you remember how much your gas-bill is?—I can send for it.

Mine is £200; and I pay some two-fifths more than I should if I got my gas in the south?—I should say that is an argument for changing your residence to the south.

I want cheap gas in the north. Surely the Committee are not appointed in any fractious spirit against your Company, but because of this 10d. per 1000 cubic feet?—And we have endeavoured to give the fullest information as to what is the cause.

Mr. Lough said information would not satisfy the consumers in the north.

Witness inquired what would.

Mr. LOUGH: The taking off of the 10d.

By Mr. NICOL: When Mr. Livesey complained of the clause in the coal contract, witness suggested that the clause would be unnecessary if they could arrange to make their contracts at the same time, and both be in the market together. Mr. Livesey, however, declined.

Mr. NICOL: We have it that the South Metropolitan contracts run from the 30th of March to the 30th of March, and yours as from the 30th of June to the 30th of June?

Witness: Yes; we buy generally in May, and Mr. Livesey buys later on in the year.

The CHAIRMAN: Earlier.

Witness: As I understand, the *crux* of the matter is this: We buy our coal; then later on Mr. Livesey wants to buy coal, and at a lower price, and cannot do it because of our clause.

Mr. NICOL: When you had this interview with Mr. Livesey, at which you made the suggestion that there should be a common understanding as to the time you bought your coal, did you suggest any date?

Witness: Well, I cannot recollect exactly what took place; but the spirit of it was that we should get rid of the clause by buying at the same time. I hold that the clause would be unnecessary if the London Companies agreed to a common date for entering into coal contracts.

We may take it that overtures, whatever they were, came from you, and Mr. Livesey did not agree to them?—The suggestion came from me on his complaint as to the clause. He said he would take care that we got no benefit out of the clause.

Now as to the reserve fund. I think your opinion is that a reserve fund is not necessary at all?—Not now—not under the sliding-scale arrangement. The objection to it is that it is tying up a certain sum at a low rate of interest for a time; whereas the whole of the undivided balance is practically a reserve fund—it is all available for making up the dividend to the statutory amount.

How long did you have this reserve fund of, I think, £500,000?—It is all in the tables. The highest point we ever reached was £517,000 in 1889.

Was this reserve fund built up by you, or was it taken over from these Companies when they were amalgamated?—It was partly made up of money coming from the Companies we amalgamated with; and that was added to our existing undivided balances.

Then you kept this reserve fund untouched to a large extent till 1892?—No.

When did you begin to part with the reserve fund?—In 1889 it was £517,000; the next year £385,000; and the year after £115,000. Then it went up, slightly, to £119,000; then up again to £122,000; then up a little more to £125,000; and in 1896, the last year in which it was a large figure, it was £132,000. Then it went down to £48,000; and in 1898 to £49,000.

This reserve fund has been depleted for the purpose of reducing the price of gas?—No; for the purpose of avoiding raising the price.

It was not until the fund was exhausted that you were compelled to raise the price of gas?—That is so. My colleagues and I thought it was much better for the consumer and the shareholder that we should utilize the fund, rather than leave it where it was and raise the price of gas.

The fund has gone, and you are now in your old position. You have had to raise the price of gas?—We had to do so a year ago. But since then the fund is creeping up again.

You do not call it a reserve fund now, but "undivided profits"?—Yes. We have carried forward undivided profits, which, when we have been short of money applicable to dividend in the half year, we have tapped to make up the amount.

Mr. LOUGH: So that you would have avoided any tapping if you had paid a lower dividend?

Witness: Yes. The money belongs to the shareholders. It is money which has been made by their capital.

Mr. BANBURY: You have been pressed as to whether you are in the position of an ordinary trading company. As a matter of fact, an ordinary trading company can pay any dividend they like, and make any charge they like, and raise their capital in any form they like; whereas you can only pay 10 per cent. unless you reduce the price of the commodity you sell, and can only raise money under a certain clause prescribed by Parliament?

Witness: That is so.

Then you were asked if you were obliged to pay a dividend of 12¼ per cent. Of course, you are not obliged to pay a dividend of 12¼ per cent., or a dividend of anything at all. It would be open for you to go to your shareholders, and say to them: "You have invested your money in this undertaking with the knowledge that Parliament has prescribed certain rates under a certain form. You are entitled under this form to pay 12¼ per cent. But the hon. Member for Islington pays £200 a year for his gas; and he would like it for £100. Therefore, you having invested your money for business purposes, should give up your right to a dividend in order that he may get his gas cheaper." In this way, you would become a philanthropic undertaking, instead of a business undertaking?—That is so. It appears to me to be a *reductio ad absurdum*.

As to the electric lighting subject. If you could go to your shareholders, and say: "We are not charging up to our full statutory right, because we think that if we reduce the price of gas 6d. (or whatever the amount may be) we shall in that way get back what we have lost through the electric light," you would have a good case?—Yes; but we do not believe it.

Your Company supply the City and the West-end?—Yes.

Well, take for instance the Stock Exchange, which uses a great deal of light. Do you suppose they would care twopence whether the charge made to them for gas was 3s. 1d., or 2s. 6d., or 2s. 1d.—that they would give up the electric light, which they have adopted because it is cool and clean, in consideration of gas being supplied at a low rate?—I do not.

You do not think that if you reduced your charge they would give up the use of the electric light?—I do not.

Take, again, the House of Commons, which used to consume a large amount of your gas. Do you imagine that any reduction you could make would induce them to go back to your light?—No.

Do you think that by reducing your price you could get back the custom you have lost?—I do not think so.

The reason being that in the richer districts the price of gas is not such an essential matter as is the obtaining of a clean, cool light?—Yes; it is like the old question of candles against lamps.

Mr. COHEN: It has been suggested to you that, the wealthy portion of your custom being equipped with electric-light installations, the fact of your reducing the price of gas would not be an inducement to them to give up the electric light and to take to gas?

Witness: No; it would be too small an inducement.

Suppose they had not equipped themselves with electric-light installations—putting that aside—do you suppose that if your charge for gas had been lower the competition against which you are struggling would have been prevented?—No; I do not think so. I think the same argument as that used in the former case would apply. Of course, the question is a difficult one; and any statement in reply would not be capable of proof. It is a variant of the same question.

There is a difference between persons who have the electric light put up going back to gas, and persons not having the electric light considering whether or not they should instal it?—Clearly, the capital outlay would be an obstacle.

If your Company are over-capitalized, you say that is not entirely a question of mismanagement, because, as I understand it, you suggest that it is a matter subject to the control of Parliament. You say that Parliament gave you the power of capitalization?—What I meant was that, at the time of the removal of our inland works to Beckton, it was well known to Parliament that it would involve the destruction of a lot of property which stood on our books representing an expenditure of capital. There was no suggestion made that we should write that off or ignore it, and that the capital should only be taken as representing new works.

When you were charged with mismanagement, you said your undertaking could not be so mismanaged because the Board are able men, because of the constitution of the shareholders, and because you are under the Board of Trade and Parliament—the latter having given you the powers to raise capital?—Yes.

That being so, you are now before Parliament. You have a Bill in the House of Lords for further powers which will carry you over, so far as you can foresee, for seven or eight years?—Yes; it will enable us to raise debenture stock.

You will be able to raise the stock when you want it?—Yes; to the extent of our powers.

Is that not one of the influences on which you rely for protection against charges of mismanagement—your being endowed by Parliament with powers which will cover you for seven or eight years to come? Do you follow my point?—I am not quite sure that I do. You say, I take it, that it would be a bad thing for Parliament to grant us these powers, because it would put us in a state of independence for seven or eight years, and we might then play ducks and drakes with our shareholders' money.

I did not intend to put it that way?—You put it colloquially.

No; I wanted to put something prompted from your own evidence. You said, I understood, that the control of Parliament was one of the influences you could urge as an evidence that you could not be mismanaging the undertaking?—I was misunderstood. What I meant to convey was that we were under the control of Government as to finance, and that we could not put an excessive amount of money to reserve, or deal with our finances in a way incompatible with our powers, without the Government or the Board of Trade, through their Auditor, coming down on us and calling us to account. This control on the part of the Government Department will remain, though we have borrowing powers to enable us to carry on our business for seven or eight years.

If your Company were to seek powers in excess of those which Parliament thought appropriate, clearly Parliament would withhold them from you?—Yes.

Does not Parliament, by giving you powers admittedly in excess of your requirements for the moment, deprive itself of the power to check you in case you are attempting to over-capitalize the undertaking?—Your point is that Parliament would act wisely in giving us a much smaller amount, so that we should have to come to them more frequently. Parliament is now cutting us down from £3,500,000 to £2,500,000, on the ground that we should not be independent too long. We still have to pass the House of Lords; and if they are of opinion that the amount we have been allowed to raise by the House of Commons is still too large, we shall have to bow to their decision.

My point is not the amount, but the period over which the amount goes. You may have a large amount one year for work which has to be carried out at once, and on which a large sum will have to be spent in a lump?—The amount for ordinary expenditure and the period when we know the approximate rate of expenditure, are convertible terms.

Mr. COHEN: They might not be convertible terms.

Mr. NICHOL: Did the Board of Trade make a report on your application for £3,500,000?

Witness: I cannot say; but I should think they would. I myself, when a Member of your House, have presided over Select Committees who have had to consider Bills of the kind; and my recollection is that we have had to deal with reports from the Board of Trade. It is the common practice for the Board of Trade to report on these Bills.

The CHAIRMAN: As a matter of convenience, I believe you do not care to come to Parliament more often than you can help?

Witness: No; an application to Parliament is a matter of loss to the consumer. The expense of promoting a Bill is one of the things which decreases the available amount for dividend and for reduction in the price of gas.

Mr. COHEN: On the question of reserve. You say you would not be able to raise capital on such easy terms as you do, if you had not depleted your reserve, and thereby equalized your dividends. My own experience induces me to share that opinion. But can you account for this: Since last week, I have taken out the yield of your stock with the reserve fund depleted, and have compared it with the yield of the stock of the South Metropolitan, whose reserve fund is not so impoverished. I find that in the twelve months of 1898 and in five months of 1899, your stock yielded to the investor, approximately, £4 0s. 3d. when it was at its highest, up to £4 9s. when at its lowest; while the South Metropolitan stock only yielded £3 18s. 9d. when at its lowest, and fell to as low as £3 14s. in January of this year?—The year 1898 was immediately after the rise in the price and the reduction of the dividend.

One other reason is that it is known by gas investors that the South Metropolitan Company have a far greater prospect of raising their dividend in consequence of their growing capacity. We are more nearly filled up. Our increase is not likely to be so great as that of the South Metropolitan. The investor is discounting the future. It pays him to take a small return now, because he thinks he can get a better one afterwards. Another point is that the agitation which sprang out of Mr. Livesey's attack on us in 1898 had the effect of injuring our Company.

The CHAIRMAN: You mean of injuring the price of your stock?

Witness: Yes.

Mr. COHEN: You refuse to attribute this difference to the fact that you have comparatively no reserve fund, while the South Metropolitan Company have one?

Witness: Well, I like to be as fair as I possibly can. I am bound to say that I think the loss of the reserve fund may have affected the minds of some people. But the main cause was the reduction of the dividend.

The CHAIRMAN: It was not reduced?

Witness: Yes; it was reduced in 1898, through an increase of 2d. in the price. We used to pay a dividend of 12¾ per cent. We lost ½ per cent. by raising the price 2d.

Mr. COHEN: We are told that you provided for a large extension of business, and that the electric light has deprived you of this extension, with the result that the capital embarked in the provision has become to a great extent dormant.

Witness: Yes. The evidence was that where we were hit in capital was this—that the people who have taken the electric light still retain our meters and services, and can still call on us for a supply of gas; and that, therefore, we are obliged to maintain works capable of giving this supply when we are called upon for it.

Some ground is suggested for the charge—I will not say of mismanagement—but of want of foresight, in your spending so much capital in making provision which is not called on. It is said that you should have foreseen that you would not have required the provision you have made?—The hon. member may have lost sight of the extraordinary character of the weather during the last few years.

The weather was not suggested. Your critics might say that you must have known that the electric light would compete with you?—The bulk of the expenditure to which you refer was incurred before the electric light competition became anything like so severe. All the trunk mains were laid, and there they remain. We are bound to be able to supply every consumer who calls upon us for a supply of gas.

The CHAIRMAN: If a new street is made, are you bound to put in a supply?

Witness: Yes. Anyone can call upon us for a supply, whether he wants it for lighting or heating.

Mr. NICOL: The Local Authority can call upon you for a supply?

Witness: Yes; for they are consumers as well.

Mr. COHEN: I wish to ask you as to your relations with your workmen. You give them pensions.

Witness: Yes.

Have you not found it of advantage to divide your profits with your workmen?—No.

Do the South Metropolitan Company give pensions?—I am not aware of it.

Mr. LIVESEY: We do, Sir, and have done since 1855.

Mr. COHEN: Then the pension plea does not affect working expenses as between the two Companies?

Witness: I did not set it up as a plea.

Mr. COHEN said he understood that the South Metropolitan Company had offered stock to their customers—and offered it at a higher price than to the general public, although it was said that the customers were quite pleased with the attention.

Witness was understood to reply that he was amused at the way Mr. Livesey had driven a coach-and-four through the Act of Parliament, by advertising in a couple of papers which nobody read.

Mr. COHEN said he put it lower than that. He asked if witness meant to offer to the consumer stock of a new creation?

Witness replied in the negative, but said that the consumer should be treated as a member of the ordinary public. He took it that Mr. Livesey's object was to get as many consumers as possible into the body of the shareholders; and in order to get more stock to supply to them, he complied with the Act by advertising the stock, and then, as it was not taken up, he allotted it to their customers.

Mr. COHEN: At a higher price we are told?

Witness: I hope the Committee will not think that I am animadverting on Mr. Livesey's action. I think he is a little illogical. He appears to seek altruistic ends by egoistic methods.

I understand that when Mr. Livesey complained of the arrangement in the clause you insert in your coal contracts, you suggested a conference, but found it impossible to come into line with him?—Yes. He declined altogether to come up to our terms, and we declined to go down to his. The only alternative was to split the difference. I suggested that.

Sir F. DIXON-HARTLAND: Mr. Field said in his evidence that you can make gas on the south side of the Thames, taking all things into consideration, for 2s. 4½d. If that is so, why do you want 3s. on the northern side? Does not that point to something wrong in the management?

Witness: Mr. Field said the cost of making gas at Nine Elms station was 2s. 4½d.—that is because Nine Elms is more favourable for manufacture than our inland stations, where half our gas is made. There is a *per contra* to be considered, because, though we can make gas cheaper at Beckton, we have not so good a sale for our coke. We can make gas cheaper at Beckton than at Nine Elms; but we cannot make all we want at Beckton. We are increasing the make there; but there is not space for the whole of the manufacture.

With regard to coal, if you agreed together (you and the South Metropolitan Company) to take coal at the same time, would it not have the effect of raising the price to the South Metropolitan rather than lowering yours?—It would average it.

You, being a big consumer, have to buy at a certain price; but they, by being able to buy at their own time, are able to make a saving which they would not be able to make otherwise?—Yes. If we bought together we should be the largest buyers; and I think we should be in a better position. It suits their business better to buy at the time they do buy.

Mr. Livesey said March was the best time to buy, and that you bought at the dearest time?—Yes; but I think the effect of our all buying at the same time would be to give us coal at a lower price.

You have most serious competition with the electric light?—Yes; and it is growing day by day. It has not invaded the other side of the river yet as it has our side.

The consumers will not go on taking electricity unless they find it makes a difference in their annual outlay?—The cost is a small factor. Most of our customers who use the electric light also take gas for fuel purposes.

Have you taken into account the cost of the instalment?—Yes.

My experience is that the electric light costs less than gas?—That surprises me. Probably you use less electric light than you formerly used gas. May I ask have you divided your bill into so much gas for lighting, and so much for fuel?

No?—That makes a great difference.

I know that people now in large numbers are calculating whether it would not be worth their while to go in for the electric light altogether. If many people decide to take this step, is it not bad policy for you to keep the price of your gas so high that the competition with you will extend instead of remaining where it is?—I would say that, in spite of the electric light, our business is an increasing one. It increases about 3 per cent. That is what I hope for this year—or even a little more. The increase where there is no electric light competition—on the other side of the river—is 7 or 8 per cent. or more.

That was not the evidence?—I think the tables show it. But there, again, the other factor is the mild winters we have had. Even in the past half year, the variations have been remarkable. In the third week of January we were standing at a decrease of 5·75 per cent., and at present we are standing at an increase of 2 per cent. In three weeks we have wiped out something like 5 per cent., and that is now replaced by an increase of 2 per cent. The small snap of cold weather we had made the difference. In 1895, we had 6 per cent increase—the largest since 1878, when we had between 7 and 8 per cent.

As to the question bearing upon your supply to the north and south of the river. Is it not unfair that your customers in the north should have to pay more because you have taken a district over which you have to supply at a lower price?—That is not our fault.

Do you think it fair that the north should have to pay for the south?—Well, I do not wish to throw blame on the Board of Trade; but the fact is that they were responsible for this, and they only.

But do you think it fair that the north should have to pay for the south?—I do not think it does.

In reply to further questions, witness said that he was not sure that it would be advantageous to the Gaslight Company to give up the southern district. If they should get rid of the southern supply, they would probably be better off if they got rid of the works too, because, though they could make gas cheaply at Nine Elms for sending to the north, they could make it cheaper still at Beckton. By getting rid of the southern district, the Company would get rid of more than a sentimental grievance—they would get rid of the differential price charged by the same Company. They would get rid of that; but *quâ* money he did not know that they would be better off.

Would it not be a weight off your backs?—Well, we are accustomed to the burden now. It is a grievance, no doubt; and in that sense we should be glad to get rid of it. But whether it can be done in the way suggested, I do not know.

The CHAIRMAN: Have you considered it?

Witness: We have never had a concrete proposition before us.

By Mr. COHEN: The Company were not obliged to pay a certain dividend; but it was only equitable to do so. Mr. Field stated the amount they were authorized to pay, and the amounts they had paid, for the last 22 years.

Mr. COHEN: From 1877 to 1886 you never did pay the full dividend you were authorized to pay?

Witness: No; but we had not then gone to the public and put the Act clearly before them as we have done since.

In the first ten years, you pursued the opposite policy to that which you have announced you feel now bound to do?—I do not say that we have adopted the opposite policy. I say we have modified our policy to the extent you see here.

Formerly you kept a reserve, and built it up?—Yes; but the money we did not divide in dividend did not go into the consumers' pockets.

The proprietors would get a larger share if this money, which should go to a reserve fund, were kept in the Company?—I do not think the proprietor who died at the end of this year would have had a larger share.

Why did you depart from your original policy?—Because circumstances became different.

Why did you begin to pay away reserve?—I have explained that. It was to avoid the necessity of increasing the price of gas.

Could you not have avoided raising the price of gas by reducing the dividend?—Yes.

The South Metropolitan Company have pursued an opposite policy. For six years they have not paid the full dividend they might have paid?—Yes. During the past ten years we seem to have changed places.

Do you not think they have pursued a wiser policy than you?—No; not under the circumstances.

The Commercial Company have also pursued a different policy to you?—Yes; but the circumstances of the Companies are different.

The CHAIRMAN: With regard to the Auditor. Has he ever called you to account for mismanagement of your finances?

Witness: No; because we always consult him before we do anything. Suppose we want to subscribe £20 to a hospital, we do not act before we have obtained his consent.

In your conduct of business, you have always kept within the strict letter of the law?—Yes; and I do not think Sir Courtenay Boyle charged us with doing anything that was against the letter of the law.

By the CHAIRMAN: He did not know what the effect had been of the clause he had introduced into the coal contracts. He understood Mr. Livesey thought he might have bought his coal cheaper if the clause had not been in existence.

The CHAIRMAN: Has it had the effect in any general way of lowering the price of your coal after you have made your contract?

Witness: I do not think we have had any occasions. Some years ago

there was one, when we got a rebate under the clause. I have no doubt the clause had the effect of preventing much greater variation of price between the Companies than there would be if the clause was not in existence. Mr. Livesey, in his evidence, said he was desirous not to make any enemies. I hope that nothing I say will be taken to indicate that there is any ill-feeling on my part towards Mr. Livesey. On the contrary, when we are off gas matters we are very good friends.

The CHAIRMAN: I think I may say, on behalf of the Committee, that both you and Mr. Livesey have been studiously polite to one another.

It had been arranged that Mr. Field should continue his evidence to-day; but Colonel Makins stated it was very important that Mr. Field should be in attendance before the Committee of the House of Lords engaged in considering the Bill of The Gaslight and Coke Company. He therefore asked the Committee to postpone taking further evidence from Mr. Field. The Committee accordingly adjourned till to-day.

HOUSE OF LORDS COMMITTEE.

(*Before Lord* BROUGHAM, *Chairman*, *Lord* BOSTON, *Lord* BOLTON, *Lord* WINDSOR, *and the Earl of* DARTMOUTH.)

EAST LONDON WATER BILL.

The above-named Committee, on Friday, the 23rd ult., considered the Bill of the East London Water-Works Company, which has already been passed by the House of Commons.

Mr. PEMBER, Q.C., Mr. BAGGALLAY, Q.C., Mr. TALBOT, and Mr. GULLY appeared for the promoters. In opposition to the Bill, Mr. BALFOUR BROWNE, Q.C., Mr. FREEMAN, Q.C., and Mr. KEMP represented the London County Council; Mr. J. C. EARLE, the Middlesex County Council; and Lord ROBERT CECIL, Q.C., the Hertfordshire County Council.

Mr. Pember, in opening the case for the Bill, said it was promoted as a fulfilment and an instalment of the Company's preparations for the future—especially with reference to the scheme which their Engineer had propounded before the Royal Commission who reported some seven years ago. The object of the Bill was to construct two additional storage reservoirs in the neighbourhood of Chingford, together with certain aqueducts and conduits necessary for the purpose of carrying the water from these reservoirs to the districts they were designed to serve. Provision was also made in the Bill for a temporary supply to be afforded by the other London Water Companies to the East London Company in case of severe drought before the works proposed in the Bill were completed. The East London Company would also by the Bill be empowered to take, in case of an emergency arising, and with the consent of the Conservators and the Local Government Board, and subject to the provisions of the Act, from the River Thames and its tributaries, by means of their present intakes or through other Metropolitan Companies, a larger quantity of water than they were now authorized to draw. The first of the reservoirs to be constructed was to be completed within three years from the passing of the Act, and the second within seven years. The Thames Conservators were ready to consent that the Company should take excess water to the extent on an average of 10 million gallons a day; but inasmuch as they recognized, of course, the undoubted fact that there would be days when a larger supply would be wanted, a certain amount of elasticity would be allowed, and the Company might take as much as 30 million gallons on any one day. This extra water was not, however, to be taken from the river unless a certain amount was left flowing over Molesey Weir. The quantity fixed beyond which the stream must not be reduced at that point was 190 million gallons in 24 hours. Certain payments were to be made to the Conservators in proportion to the amount of water drawn from the river; but it was not correct to say that the Water Companies paid for the water taken from the Thames. True, the payments varied with the quantity taken; but that was because one of the duties of the Conservators was to keep the Thames pure, and the interests of the Water Companies in the purity of the stream was so great that they ought to find the money to do so. Therefore, acting on this principle, the more they took the more they were interested in the purity of the stream, and the larger should be their subscription. The learned Counsel then entered on a history of the East London Company, and said that the proposals of the present Bill would, when carried out, raise the capacity of the Company's storage reservoirs to the total of 7500 million gallons, which would be 500 million gallons beyond what was set forth in the scheme laid before the Royal Commission. After dealing with the objections of the various petitioners to the scheme, the learned Counsel said the London County Council were asking their Lordships to re-try the whole cause tried by the Royal Commission. It was simply Wales *versus* the Thames Valley and the Lea.

When the Committee re-assembled on June 26, Mr. Baggallay (replying to questions put by the Chairman) said that the Bill promoted by the Government, which had been passed, would only enable a Water Company in the event of their having a surplus of water to assist another Company having a deficit. Some of the Companies, however, had no margin of supply at all. The proposals of the present Bill did not necessarily entail the further depletion of the water in the river by an extra quantity being abstracted day by day, but rather meant that advantage would be taken of the river being full to impound water in the storage reservoirs.

Mr. W. B. Bryan, Engineer to the Company, was then examined in support of the Bill. After describing the area of supply, he said the population served with water by the Company in London, Middlesex, and Essex numbered 1,311,000, of whom 770,000 were in London. The two reservoirs it was now proposed to construct would be 846 acres in extent, and of a total capacity of 5300 million gallons. Not more than 10 million gallons, per day of 24 hours, of excess water for temporary supply would be taken. The power of taking excess water would be placed absolutely under the control of the Local Government Board, who would decide when an occasion was one of emergency. The power was further made a temporary one by being limited to the period of construction of the reservoirs authorized in 1897, on the completion of which it would at once lapse.

In cross-examination by Mr. Freeman, witness said that the new reservoirs were to cost about £1,000,000. They were not altogether to cope with a very remote contingency. They were to meet such a drought as that which occurred last year, and to provide more water for the yearly increasing population within the Company's district. Last year's drought was the worst of which there was any record. The reservoirs would be filled by gravitation up to a certain level, and to the extent of another 18 feet by pumping. East London could not wait for eighteen or twenty years in order to get water from Wales as proposed by the London County Council. The first reservoir, to be made in the Lea Valley, was much the larger one, and would be finished, if the Bill passed, in three years. The second would be completed in another seven years. He did not think that the fact that a Water Commission were now sitting ought to lead to the postponement of the Bill. It was not the case that the Bill was promoted with the object of increasing the selling value of the Company's undertaking to the London County Council; it was promoted solely with the intention of providing a proper supply of water for the people of East London.

Cross-examined by Lord R. Cecil, witness said he did not believe that the contention of the Herts County Council, that the Company's various wells were seriously lowering the supply of water obtainable from the chalk in Hertfordshire, was well founded. At the present time, the Company were pumping about 13 million gallons a day from the chalk. Only one of the wells—that at Waltham Abbey—had been specifically sanctioned by Parliament. All the rest were on the Company's own land. They proposed to increase the supply from these sources to 20 million gallons. In his opinion, Hertfordshire was not injured in the slightest degree by the Company's wells. The pumping of water from the chalk under London had had the effect of reducing the level of the water under London, but not under the Lea Valley side of London.

On the following morning, Mr. James Mansergh, examined by Mr. Baggallay, said he was a member of the Commission presided over by Lord Balfour, who considered the question of the London Water Supply. Before that Commission, Mr. Bryan had propounded a scheme in regard to his Company; and the evidence placed before the Commission was that by means of adequate storage the East London Company's sources of supply would be sufficient for a period of forty years. After full consideration, the Commission came to the same conclusion. It would always be necessary to use the local sources. Any supply that could be brought from a distance—such as that from Wales—should be considered, not as an alternative to the existing sources, but really as supplementary. If London continued to grow, every drop of water obtainable from the Thames and the Lea and the chalk round London would have to be utilized, as well as what might be brought from other sources. He considered the proposed reservoirs would be necessary, even if water were brought from Wales. He thought it would be great folly if any source were abandoned. If the Lea were to be drawn upon, this scheme was a very proper way of doing it. The droughts of last year and 1897 were abnormal; but after such experience the time had, in his opinion, arrived when the reservoirs now proposed ought to be commenced to meet such contingencies, should they again arise. Experience had shown that the instalments of storage must be accelerated. He had considered the estimates for the works; and as prices now stood, they were fair ones.

Cross-examined by Mr. Balfour Browne: He considered the scheme an economical way of obtaining water. Whether London went to Wales or elsewhere, these sources at its very doors should be always utilized.

Mr. G. H. Hill was next examined. He said the works proposed in the Bill would give 5300 million gallons storage. Circumstances during the next twenty years might change the conditions; but the figures adopted were the safest, and the scheme was a sound one, because it utilized the water at hand before going farther afield. The present scheme would not exhaust the waters of the Lea.

Cross-examined by Mr. Kemp: The present scheme was to bring up the supply of the Company to 60 million gallons a day. A large quantity of water would still run to waste, even if the proposed reservoirs were made; and he should contend that this water ought to be taken if necessary. The Company were bound to use the experience gained in the last two years as the basis of calculation.

Mr. E. M. Eaton said that if sufficient storage were provided, every drop of the rainfall of the Lea Valley beyond what was absorbed by vegetation and evaporated could be dealt with. The reservoirs did not propose to deal with the entire yield. Therefore the water in them would be drawn down for months, and then they would be refilled. The present scheme was not an extravagant one, and would compare well with any for the construction of reservoirs in mountainous districts. London clay would underly the reservoirs; and they knew to a foot how deep they would have to go. The local sources were the most economical for the East-end of London. There would be no justification for going to Wales.

Cross-examined: The present supply to East London was such that the proposals of the Government Bill might meet the needs; but the Company ought to have resources of their own which they could directly control. He thought that the insertion in the Bill of a proviso that the works under the Bill should not add to the value of the undertaking in case of purchase was altogether wrong.

Sir Frederick Bramwell said the waters of the Lea were of admirable quality; and instead of allowing them to run to waste, it was proposed to intercept and store them. This scheme, in its simplicity, approximated nearest to the Staines plan. He saw no necessity to go to any other source. Beyond a certain amount of compensation water, the whole Lea belonged to the New River and East London Companies. The proposal here was only to take the water when there was plenty to take, and not in times of drought. The East London Company were simply following up the recommendations of Lord Balfour's Commission. In cross-examination, witness said he thought it would be wicked waste to allow this water to run away.

Mr. Walter Hunter, Engineer to the Grand Junction Water Company, and General Engineer to the Staines Joint Committee, said he supported the proposals of the Bill. He had considered what assistance his Company might give to the East London Company; and at present they could render very little. But when the new main was completed, if the power proposed in the present Bill to take excess water from the river were granted, they could then spare about 6 million gallons a day to be sent through the New River Company to the East London Company.

This closed the promoters' case; and evidence was taken on behalf of the opposition of the Hertfordshire County Council.

Lord Cowper was the first witness called. He said he had been since its creation Chairman of the Hertfordshire County Council, and was well acquainted with the feeling of the people of the county in regard to the abstraction of water. They were strongly opposed, as was his Council, to any further abstraction of water by the Company. He had been advised that the drought of last year would not have been so severely felt but for the pumping by the Companies. Some conditions should be placed on them in connection with the large powers they were obtaining under this Bill.

Sir John Evans, Vice-Chairman of the Hertfordshire County Council, gave similar evidence.

In cross-examination, he said, his Council were seeking that the Company should not under the Bill obtain powers to spend more money in pumping from wells. The Company were asking for money without mentioning the purpose to which it was to be applied; and they were asking to have it allotted to certain purposes. The Company's statutory powers were useless without money.

Mr. Smith, Engineering Adviser to the Hertfordshire County Council, said the record of the failure of springs and wells in Hertfordshire last year was such as had never been reached before, and the rivers were lower than ever known. If the water were drawn from the chalk, the supply to the springs diminished. The effect of the pumping had been to reduce the flow of the Lea and its tributaries and to dry up the Chadwell springs. From 1889 up to the present time, the flow of the Lea had diminished 43 per cent.

Lord R. Cecil contended, on behalf of the Hertfordshire Council, that the money raised under the powers of the Bill should be earmarked so that it might not be used in sinking new wells in Hertfordshire or extending present ones for the supply of districts outside the county.

On Wednesday, Mr. Balfour Browne opened the case on behalf of the London County Council. He said at once that the Bill was one which should not be allowed to proceed. The only justification for such a measure would be necessity; but he would show that there was no necessity for the present proposal. He would also endeavour to show that the passing of the Bill would seriously prejudice the whole of the great question of the water supply of London, which was at present being considered by a Royal Commission, whose report was almost daily expected. The Bill sought to do two different things. The first was to get what the promoters called a temporary supply of water from the Thames—and, of course, there might have been a great deal said on this last year, after the water famine in the East of London. The London County Council, more than any other body, he thought, deprecated the want of foresight on the part of the East London Water Company which had failed to provide the means necessary to tide over a great difficulty. But this difficulty had been got over by the assistance of the other Water Companies. When the matter was inquired into by the Royal Commission, it was suggested that further means of intercommunication between the Companies was essential—suggested by members of the Commission rather than by anyone outside. The Engineer to the East London Company was cross-examined by the Committtee; and he said that the Company were then in a position to tide over any such difficulty as had arisen last year. The accuracy of this would be tested very shortly, because they were still in a period of drought. He hoped sincerely, for the sake of the people of the East of London, that Mr. Bryan was right, and that the Company had resources to meet a water famine. It was after full experience of the drought that Mr. Bryan had told Lord Llandaff's Commission that the Company were on the point of effecting intercommunication with the other Companies, and that he had everything he wanted for the present year. The Company were now in a superior position to what they occupied when Mr. Bryan took up this position, because the Government measure for intercommunication and supply between the several Companies had become law. He (the learned Counsel) therefore asked the Committee to come to the conclusion that the present Bill was unnecessary, and should not be passed; being contrary to the first report of the Royal Commission. The Bill of the Government gave a Company with a surplus supply power to hand on that surplus water to another Company; and it certainly seemed a very proper thing that if one Company in the West-end had more water than they wanted, and another Company in the East-end had not sufficient, the surplus water of the former should be handed over to the latter. The Royal Commission had said they would allow intercommunication, but would not permit any more water to be taken from the Thames, as it would be abstracted in all probability at a time when the river was low. Well, this Bill sinned against that decision. The Government Bill, founded on the report of the Committee, did not allow the Companies to draw a single drop of water from the Thames, because the Commission had not yet determined the very important point raised before it, that the Thames should not be further depleted. The Committee were not now asked to take away any statutory powers the East London Company had; but they were asked to say that no further water should be taken from the Thames. The actual abstraction from the Thames was 113,415,000 gallons a day. The statutory powers before 1896 were 130,000,000 gallons; but under the Staines and Southwark and Vauxhall schemes, an additional 55,500,000 gallons could be drawn. Therefore the full power was to draw 185,500,000 gallons. The Companies were drawing 72,000,000 gallons less than their statutory powers entitled them to draw.

Mr. Baggallay pointed out that 35,000,000 gallons of this could not be drawn until the Staines reservoirs were completed.

Mr. Balfour Browne said that even without this there were unexhausted powers to take 64,220,000 gallons a day. He pointed out that the Thames was not only for drinking purposes; and that any further abstraction of water at the pumping-stations would tend to the silting up of the river, and to the injury of London. He would ask the Committee to come to the conclusion that, for temporary purposes, the power to take water from the Thames was unnecessary. With regard to the part of the Bill in which it was sought to spend £1,400,000 on new reservoirs and works, he maintained that the powers should not be granted pending the settlement of the whole Metropolitan Water Question. In dealing with this matter, the Government and the Local Government Board had unfairly favoured the Water Companies as against the London County Council; but he was glad he was now before a Committee of the House of Lords, for their Lordships, he knew, cared nothing for the Government nor the Local Government Board. He asked them not to prejudice the interests of the ratepayers of London by allowing a scheme which would saddle them with an expenditure of £1,400,000 (which was entirely unnecessary) in the event of purchase. No Company should be allowed to enhance the value of their undertaking by an intercommunication scheme. At the present time, the East London Company were a defaulting Company. They could not supply in times of drought. In the event of purchase, the arbitrators would consider how well the income of the Company was secured. If it were well secured, he would award something like 33½ years' purchase—in the case of gas companies the highest award worked out about 28 years' purchase. But if the Council went before the arbitrator and said the Company could not earn their proper income last year, because they had not the water to supply, the arbitrator would then say it was not well secured, and that he must award a smaller number of years' purchase. If however, this Bill were passed, and the Company were in default, they would answer: "But Parliament has given us powers to construct two reservoirs; and we shall soon be in a position to supply all our consumers." They might also claim for surplus work², which would be a legitimate matter to put before the arbitrator. Under the present Bill, the Company would obtain similar powers in regard to the intersale of surplus water with other Companies which were conferred by the Government Act of this year, but without the clause which was in that Act providing that the intercommunication should not enhance value. The Council did not want any more water to be taken from the Thames or the Lea; and, further, they contended that the proposals of the Company were extravagant, and would enhance the value of their undertaking against any possible purchaser. He therefore asked the Committee not to pass the Bill.

Sir A. Binnie, the Engineer to the London County Council, examined by Mr. Kemp, said he gave evidence before Lord Llandaff's Commission in regard to the construction of reservoirs to take more water from the Lea; and in this evidence he pointed out that such reservoirs would be seldom wanted, and that it was a very wasteful way of providing for emergencies. It was clear that the proposed reservoirs would in a few years be surrounded by houses, as the population of the Lea Valley was more rapidly increasing than that in any other part of the suburbs. The quality of the water was at present good; but there was no guarantee that it would continue to be so. It might deteriorate. Mr. Greaves, the late Engineer of the East London Company, had stated before the Duke of Richmond's Commission, in 1869, that his Company ought not to continue to depend upon the Lea supply alone. One of the most important points raised by the Balfour Commission was that the reservoirs drawing their water from the Thames and the Lea should be carefully guarded to prevent the flood water being taken; and it was quite obvious that if the whole flow of the Lea was to be absorbed by the Company, the 5400 million gallons passing down the river would be insufficient to keep the Lea pure. The tidal portion of the Lea was in a most filthy, disgusting state, and was a disgrace to civilization. The Lea flowed through East and West Ham—one of the most densely populated portions of London. In the years 1881, 1882, 1883, 1885, 1886, 1890, and 1892, these reservoirs, if constructed, would not have been required at all. In the years 1884, 1887, 1888, 1891, 1893, 1894, 1895, 1896, and 1897, the reservoirs would have been drawn down to an extent that would be easily met by the works authorized by Parliament in 1897. The water would have to be twice pumped; and it was useless to compare this with a gravitation scheme in which the reservoirs would receive the water by gravitation, and it would flow into the town by gravitation. Lord Balfour's Commission had recommended that a record of the Company's pumpings should be sent to a Government Department. The water under London was lowering at the rate of 18 inches per annum; and was now 100 feet below Ordnance level. The same thing would happen in the Lea Valley, if these quantities of water were taken. The Company ought not to be allowed to take more water from the Thames. They could not do it through their own intake, as the pipe would only carry 10 million gallons a day, and the water could only be taken through some other Company. The flow of the river was reduced last year to 80 million gallons a day; and with a little more draught and draw on the river, there would not be much left.

Cross-examined by Mr. Baggallay: In a mountainous district, one could afford to take in the floods and fill up the reservoirs; but the floods coming down from a district containing 200,000 persons was another, and not a nice thing. You must exclude the floods; and if you did so, you could only get 52 million gallons from the River Lea. All the great towns of the country were going, or had gone, to purer sources of supply. Lord Llandaff's Commission, dealing with the East London Company, said that the auxiliary supply should not be held to relieve the Company of their responsibility for providing storage of their own. But the present Bill went beyond that. The Company had power, under the Bill of 1897, to construct reservoirs. They were not completed; and the Commissioners were pointing out the necessity of getting the works finished. He agreed with Mr. Mansergh that they should get an outside supply as well as keep the present one. Notwithstanding Lord Balfour's report, it was becoming the opinion more and more of people interested in the question that the less that was taken of the Thames and Lea water the better. He agreed that the quantity and quality were good; but the reservoirs were becoming more and more surrounded with people. It would take fifteen or twenty years to get water from Wales for the supply of London; and during this time the people of East London could be supplied by an enlarged draught taken from the Thames.

Mr. G. F. Deacon, examined by Mr. Kemp, said he had specially considered the question of the necessity for the present reservoirs. Witness handed in a diagram showing that for the first 16½ years the proposed reservoirs would be practically useless, because the supply would be obtained from the existing and authorized reservoirs having a capacity of 2225 million gallons, so that the additional capacity now proposed of 5775 million gallons would not be brought into use. After giving particulars as to rainfall, to show that the proposed reservoirs would during certain periods be uncalled for, witness said that to carry over flood water from one year to another was always an undesirable thing to do, and involved the construction of reservoirs which would be used only once in many years. The existing and authorized reservoirs would utilize the flow of the Lea as far as it was possible to do so.

Mr. W. H. Dickinson, Chairman of the Water Committee of the

London County Council, said he was conversant with the whole question of the water supply of London. In regard to the temporary supply proposed in the Bill, the Government measure did all that was necessary—not by authorizing any fresh draught on the Thames, but by providing for the utilization by the Companies of their present powers, which already provided a very large amount of reserve. He asked the Committee to reject the whole of the portion dealing with temporary supply, because it would give the East London Company a perpetual right to draw this water in case of emergency, and be brought into charge in the case of purchase. He believed that Parliament could safely postpone the passing of the Bill.

This closed the case for the London County Council.

Mr. J. C. Earle then addressed the Committee for the Middlesex County Council. He said the present measure was unnecessary, in view of the Government Act. If the power to take excess water were limited, as Mr. Pember had stated—as it appeared by error—in his opening it would be, to the period of the construction of the reservoirs of 1897, it would largely remove the objections of the Middlesex County Council to that part of the Bill. His Council substantially agreed with the London County Council that, until the Royal Commission had reported, there was no urgent necessity for the construction of the proposed reservoirs. As far as Middlesex was concerned, there was no need for the proposed works; and the Middlesex County Council felt that the time had come when a new source of supply should be found. London should go further afield, and leave what remained of the waters of the Lea to Middlesex, who had a right to look to this source for the supply of its large and increasing population. The Middlesex County Council had just the same feeling in regard to wells as the Hertfordshire County Council, and submitted that it was not right that there should be any power whatever given to construct further wells.

After hearing the evidence of Mr. Wade, Engineer to the Middlesex County Council, the Committee were addressed by Mr. Baggallay, in reply, on behalf of the East London Company. The learned Counsel dwelt at length upon the reports of the various Commissions and Committees who have had to deal with the water supply of London. He said that the present Commission, under which Lord Llandaff and his colleagues were sitting, turned upon the point whether there should be purchase at all. There was no longer a presumption in favour of purchase; and therefore the evidence of the London County Council was irrelevant. The scheme in no way prejudiced the consideration of the matters referred to Lord Llandaff's Commission. Even if water was to be obtained elsewhere, it was perfectly clear that no great supply could be brought in in time to prevent the necessity for utilizing the local sources. The existing sources of the East London Company were insufficient; and the only question was whether they should be supplemented by water from here or some twenty years hence from Wales or elsewhere. The water taken into the reservoirs would not affect the wells. The water which was pumped from the wells was water which came down to the points where the wells were, and which came down to these points because Middlesex and Hertfordshire did not want it. To make an alteration in the Bill in regard to the law regulating underground waters would be to set a precedent equally applicable to other places throughout the United Kingdom. The proposals of the Bill were not made to enhance the value of the Company's works. The moment a profit was made, it would go to the sinking fund, not to the Company. The opponents of the Bill asked that, if the Company were bought out next year, it should not be as a Company having power to supply their own district. They wanted the Company to be purchased in their present condition, in which they were unable to supply all the water required in their district—to get the Company into a hole, and say, when the question of purchase was raised: "Oh, the Company cannot supply their own consumers." As to taking water from the Thames, the Conservancy had approved of the Bill; and their consent was necessary to the taking of excess water. When the river was low or getting low, abstraction would be stopped; but when it was full, the water would be taken and stored. It was urged that the water going over Teddington Weir was not sufficient for the purposes of the river; but this was a question which had been raised on every Water Bill since 1894. The Conservators had agreed that 200 million gallons was enough; and that was the gauge taken in the Bill.

The Committee deliberated; and on the public being re-admitted, the Chairman announced that the preamble of the Bill was not proved.

HOUSE OF LORDS COMMITTEE.

WEST MIDDLESEX WATER BILL.

A Select Committee of the House of Lords presided over by the Earl of Spencer (the other members being the Duke of Marlborough, the Earl of Mansfield, Viscount Crofton, and the Earl of Arran) on Friday week had under consideration the above-named Bill, which was passed by a Committee of the House of Commons on the 12th ult. It is to empower the West Middlesex Water Company to construct additional works, to take more water from the Thames, and to raise £250,000 of capital by the issue of debenture stock. Mr. Pember, Q.C., and Mr. Claude Baggallay, Q.C., appeared for the promoters; Mr. Worsley Taylor, Q.C., and Mr. Lewis Coward represented the Twickenham Urban District Council, the only remaining opponent of the measure. One of the principal works to be carried out under the Bill is the laying of a 40-inch main from the reservoirs at Hampton to those at Barnes. It will be some ten miles in length; and it is proposed to carry it along the main roads. On behalf of the District Council, it was complained that the main would pass through Heath Road, Twickenham, the subsoil of which was already greatly crowded; there being no less than six mains passing through it. The Council therefore asked that a clause should be inserted in the Bill to prevent the Company from putting the main under the footpath without their permission. The insertion of a further clause was also contended for, to indemnify the Council against any extra expense they might be put to in the future in building any necessary new sewer, if the additional cost was caused by reason of the presence of the main. After hearing evidence, and the addresses of Counsel, the Committee decided that the clause in the Bill was sufficient to meet the case of laying the main under the footpath, and refused the indemnity clause asked for. The preamble of the Bill was passed.

WARRINGTON CORPORATION WATER SUPPLY.

Additional Works.

The Committee of the House of Commons on Police and Sanitary Regulations Bills, presided over by Sir Stafford Northcote, have lately had before them the Bill promoted by the Warrington Corporation to enable them, among other things, to construct additional water-works, and to borrow further money, to the amount of £282,000, for their water undertaking.

The Corporation were represented by Mr. Pembroke Stephens, Q.C., Mr. Wedderburn, and Mr. Ram. The principal petitioners against the water portion of the Bill were Sir Gilbert Greenall, for whom Mr. Balfour Browne, Q.C., and Mr. E. Honoratus Lloyd appeared, and the Manchester Ship Canal Company, represented by Mr. Pember, Q.C., Mr. Balfour Browne, Q.C., and Mr. Du Cane.

In opening the case, Mr. Pembroke Stephens set forth the water supply proposals of the Corporation and the nature of the opposition to them. He said Warrington was one of the largest non-county boroughs; and its growth had been very considerable. In 1851 the population was 22,000, and the rateable value £52,000. The population was now 63,000, and the rateable value £210,000. In addition, the borough area for water supply had seven townships in Lancashire, with a population of 11,500, and twelve in Cheshire, with a population of 10,165—making a grand total of 84,665. They were now actually supplying 77,000 of this population with water. At present the supply came from two distinct sources—one for domestic and the other for purely trade purposes; and it was intended to maintain this marked feature. The pumps for the domestic supply were at Winwick; the trade supply being obtained by gravitation from a reservoir at Appleton, on the opposite side of the borough, constructed under powers obtained in 1846. They proposed to increase the domestic supply by erecting an additional pumping-station at Winwick; and to this part of the Bill the Committee would not hear any opposition. With regard to the trade supply, they proposed works of considerably increased capacity for storage—a new reservoir at Dennow and another at Daresbury; but the water would be taken from the streams already used. Against this part of the scheme there were two petitioners—the Manchester Ship Canal Company and Sir Gilbert Greenall, as a landowner. The Company alleged that the works would interfere with the overflow from the streams, which they alleged now passed into the river Mersey, and to which they held they had a right. If they had any legal right—which he neither admitted nor denied—it was reserved to the Company by the Bill, which incorporated the full compensation clause of the Water-Works Clauses Act. If the Company, therefore, could satisfy the proper tribunal that they had been injuriously affected by what was done to the streams, then they would be entitled to compensation. He thought this disposed of that part of the petition. But the Company raised an extraordinary contention. When they constructed the Canal, they were bound to provide a culvert under it, so that the water-pipes could be properly attended to, duplicated, enlarged, &c. But they now alleged that the Corporation were laying a main through the culvert for an entirely new purpose; that the water was to pass through it at a high pressure; and that the safety of the culvert and of the Canal might, therefore, be endangered. His reply was that they were using the culvert for the purpose for which it was constructed, and that there was no fear of damage to it or to the Canal. As to the petition of Sir Gilbert Greenall, while the works were on part of the estate, they would in no way interfere with the hall. If the value of the estate was diminished by the destruction of trees, compensation would be given; and he thought that the reservoir embankments could be so constructed as to form a pleasing, and not an objectionable, feature of the landscape. The petition further alleged that a large area of grazing and building land would be deprived of the water now supplied from the Daresbury Brook; but this was not so, as the same legal quantity would still flow down that stream. Then it was complained that no compensation was given in respect of the Grange Mill on that brook; but evidently the petitioner had forgotten that compensation was paid by the old Water Company to the previous owner for this very matter to the extent of £350. A similar claim was made with respect to the Walton Mill on the Dennow Brook; but in this case the agent of Sir G. Greenall had a few years ago decided, as Arbitrator, that there could be no claim for compensation. Sir Gilbert suggested two alternatives. One of these was for the Corporation to avail themselves of their power to take 2 million gallons of water a day, on certain terms, from the Vyrnwy works of the Liverpool Corporation; but as one of the terms was that Liverpool should have a preferential right to take 30 gallons per head per day, Warrington did not think it would be wise to have a supply on which they could not always depend. The other alternative was that the Corporation should accept the offer of the Bold Hall Estates, Limited, to supply 1½ million gallons daily of colliery water, at 2d. per 1000 gallons. But this alternative must be rejected because of the general opposition of the Local Government Board to such sources of supply being accepted by any Corporation, and also because this particular water was so hard as to be absolutely unsuitable for trade purposes. The neighbouring borough of St. Helens had tried such a supply, and had to give it up, at considerable loss, because of its unsuitableness.

Evidence in support of the Bill was then called. The Town Clerk of Warrington (Mr. J. Lyon Whittle) proved the holding of the town's meetings; and, in cross-examination, admitted that several members of the Council voted for the Bill after an explanation that the Daresbury reservoir would not be made for some years to come. Mr. E. L. Mansergh explained the engineering details of the scheme. He acknowledged, in cross-examination, that an embankment, 72 feet high, would be seen from Sir G. Greenall's park, and the scheme proposed to obliterate the principal wood on his estate. Mr. G. H. Hill also gave engineering evidence in support of the scheme. He said he thought the promoters were justified in looking ahead for at any rate twenty years. He did not consider that the proposed Daresbury works would prejudicially affect to any very large extent the estate of Sir G. Greenall, or that the alleged obstruction of the overflow water of Daresbury Brook would have any appreciable effect on the level of the water in the Latchford and Eastham section of the Canal. He saw no danger to the culvert in passing a main through it with a high pressure of water. Colonel W. Hall Walker,

Managing Director of Messrs. Peter Walker and Son, of Warrington, as a large ratepayer, supported the Bill; believing that a further supply was necessary, in view of the increasing population and business necessities of the borough. Sir E. Frankland spoke to the character of the water specified in the Bill. He said the Winwick water was most excellent for domestic use, but was too hard for manufacturing purposes. The Appleton water had little difference in the degree of hardness; but it contained an amount of organic matter which made it suitable for trade uses. The Bold Hall Colliery water, on the other hand, was not, because it acted violently on iron pipes owing to the presence of dissolved oxygen and some nitrates. Professor Boyd Dawkins was called to speak on geological matters; but as these were not in dispute, he did not give evidence. Mr. Charles Hawksley followed, and said that, in his opinion, the scheme was well adapted for Warrington, as it enabled the inferior surface water to be used for trade purposes. No residential damage would be done to Sir G. Greenall's estate; and any other injury could well be met by money compensation. Mr. D. M. F. Gaskin, who was Water Engineer at St. Helens from 1876 to 1893, said the Corporation entered into an agreement with the Collins Green Colliery for part of their water supply, but had given up using it. The supply diminished from 1,000,000 to 640,000 gallons. Mr. James Deas, Water Engineer to the Corporation of Warrington, stated that the consumption of the Appleton water for trade purposes increased from 31 million gallons per annum in 1887 to 94 millions in 1897, and upwards of 98 millions last year. The applications for trade water were 20 to 30 per cent. more than the Corporation could at present supply. It was their intention to construct the Dennow reservoir as soon as the Bill passed; and then, if occasion demanded it, as they anticipated it would before long, they would make the Daresbury reservoir. These reservoirs were not necessarily connected, and there would be no loss in constructing the former without the latter. Alderman Roberts, who had been reported as stating that it was not the intention of the Corporation to start the Daresbury scheme for some years, was called in regard to this matter. He assured the Committee that it was never his intention to suggest that the Daresbury reservoir would not be constructed. His speeches were made to show the Council and the ratepayers that the work would be carried out in sections, without the necessity for a water-rate. The statement issued by the Corporation made this quite clear. Mr. J. Mansergh said he thought the Ship Canal Company could be compensated for any interference with the overflow water to which they might be found to be entitled. There could be no danger to the culvert in the Canal through which the water-main passed. He calculated that the Daresbury reservoir would absolutely require to be made after about five years' time. It should be ready for use in about seven years; and even then it would only be sufficient for about six years after that. It was absurd to have to come to Parliament every few years for further water-works. The Daresbury reservoir had been placed in a position where they could best use the watershed; and while he was sorry that the wood must go, they had no right to spoil good water-works for the sake of a little wood for which compensation could be given.

This closed the promoters' case on the water portion of the Bill. After deliberating in private, the Chairman announced that the Committee considered the demand put forward in the Bill was premature so far as the Daresbury reservoir was concerned; and therefore they could not sanction it. Mr. Pembroke Stephens, after consultation with Mr. Lloyd, said they had agreed as to the construction of the Dennow reservoir. The arrangements with regard thereto were not exclusively in the hands of Sir G. Greenall, and certain terms had been accepted by the other parties interested. These terms had been accepted by Sir Gilbert's representatives; and therefore there was now no opposition to the water proposals so far as he was concerned.

Evidence was then called on behalf of the Ship Canal Company. Mr. W. H. Hunter, the Chief Engineer, said the construction of the Dennow reservoir would daily deprive the Canal of the 550,000 gallons of water which now came from the Appleton reservoir; and this amount meant the loss of three locks a day, out of an average of eighteen to twenty. If the Dennow reservoir was constructed, the Corporation should be put under an obligation to supply compensation water to the extent of 550,000 gallons daily for four days a fortnight. Money would not compensate them for what would be an irretrievable damage if this water were withdrawn; and it would be no injury to the Corporation supply to provide the water. As to the culvert, it did slightly leak; but the water was pumped out every day. He did not see how the new high-pressure main could be placed in the culvert; but he viewed its presence there with much apprehension. With a pressure on the main which he calculated would be over 200 lbs. per square inch, he feared that a burst might rupture the culvert. There were also two other culverts close by which would be damaged by a burst. If there was a risk, it should be borne by the Corporation, not by the Company. In cross-examination by Mr. Pembroke Stephens, he admitted the right of the Corporation to replace the existing mains in the culvert, but not with a greatly-increased pressure of water. If the eminent Water Engineers called by the Corporation were under no apprehension, he could not understand why they should advise the Corporation not to accept any responsibility. The quantity of water from the Dennow Brook passing into the Canal was gauged near it; and whatever it now was he wished to have continued. Sir Leader Williams, the designer of the Canal, followed, and stated that all the Company asked was that the quantity now sent down, if only 50 gallons a day, should be continued. Money compensation was of no use.

At this point the Committee had a consultation in private, at the close of which the Chairman said he had received a communication from a Mr. Gough, the Honorary Secretary of the Warrington Ratepayers' and Property Owners' Association, enclosing certain papers alleging improper practices in connection with the taking of the poll for the promotion of the Bill. After full consideration, they had decided to send for him.

Mr. Balfour Browne then addressed the Committee, contending that the Corporation should be put under strict obligations to provide compensation water, and should also take the liability of risk to the culvert under the Canal from the presence of the high-pressure water-pipe. During the learned Counsel's address, the parties came to terms as to the compensation water; the Corporation agreeing to give the Canal Company at the Appleton reservoir 217,000 gallons a day during the four days in a fortnight when the tide does not enter the Eastham section of the Canal. The Committee decided to afford the Company an opportunity of bringing up a clause for their own protection; proposing any tests or guarantees they thought necessary as to the specifications for the pipe and any other matters of the kind.

On the following day, Mr. Gough attended in answer to the summons of the Committee, and stated that he adhered to the charges against the Corporation with regard to the poll which he made in a local newspaper on the 18th of March last. One of these was that canvassers were employed by the Corporation for the Bill, and were paid 7s. 6d. a day, and 2s. 6d. extra if they got a majority in its favour. Another was that these canvassers filled in the voting-papers without the consent of the voters, and collected them after the police officers had made the proper collection. He believed that 90 per cent. of the papers were filled in by the canvassers. Had the poll been taken under the ballot, the majority would have been against the Bill. He objected to the measure, even as modified by the Committee. Mr. W. Holbrook, Conservative political agent, said he did not employ canvassers until he found that the Ratepayers' Association were doing it. He then did so; but he instructed them not to go round with the police when they were distributing and collecting the voting-papers. The canvassers were paid 7s. 6d. for the day, and 2s. 6d. extra if they worked in the evening. They were told only to fill up papers where the voters were unable to do so, and then to get them to make their mark. In reply to questions by the Committee, he said he did not think the appointment of canvassers for the Bill was inconsistent with his position in making all the preparations for the polling. The Corporation paid for the canvassers. The total cost of the poll was about £100. Mr. John Clayton, the Liberal agent, corroborated Mr. Holbrook's evidence.

After deliberating for some time in private, the Chairman said the Committee must place on record their disapproval of the use of the ratepayers' money, and the employment of political agents, practically for the purpose of influencing the electors, as admitted by the promoters' evidence; but at the same time they felt that were they to reject the modified Bill the ratepayers would still have to pay the expenses of the promotion of an unsuccessful measure. The provisions of the Borough Funds Act having been complied with, they were not prepared to go the length of rejecting the Bill, or of requiring another poll to be taken; but they thought it their duty to place this expression of opinion on record.

The clause embodying the Committee's decision on the Canal Company's opposition was then dealt with. The Corporation agreed, after the construction of the Dennow reservoir, to give on four specified days every fortnight 217,600 gallons a day from the Appleton reservoir, under a penalty of £50 a day. The Company asked, as an additional penalty for wilful default, a right of action for damages; but the Committee refused it. A discussion took place with regard to the high-pressure pipe; and ultimately it was determined by the Committee that it should be made of steel, to the designs and satisfaction of the Company's Engineer, and that it should be tested to resist a pressure of 500 lbs. to the square inch.

The Committee then dealt with the other portions of the Bill, and eventually passed the preamble.

When the clauses came to be considered, Mr. E. L. Mansergh proved the estimates with regard to the water-works scheme as amended by the decision of the Committee to strike out the Daresbury reservoir portions. Instead of a total of £282,000, it would be £169,000, of which £109,000 would be for the domestic supply, £30,000 for the trade supply, and £30,000 for extensions of mains during the next twenty years. These estimates included the cost of the land, which he put at about £5000. On the question of the repayment of the borrowed money, the Borough Treasurer (Mr. John Fairhurst) stated that the terms were those ordinarily sanctioned by Parliament. Fifty years were taken for the repayment of the loans in connection with the general purposes of the Bill, and sixty years for the water-works and park. The Committee were asked to give five years' interval before payments into the sinking fund for the water-works expenditure should commence; but witness said that if they found they could begin the repayments earlier they would do so, as they had done with regard to previous sinking funds. The Chairman asked why the original Bill did not contain some such proposal. Mr. Pembroke Stephens said that, through some oversight, the original clause did not contain the provision; and that, on the promoters suggesting a suspension for ten years, the Chairman of Committees of the House of Lords (Lord Morley) said he could not consent to a period of more than five years. Mr. Boyce (for the Local Government Board) said it was most unusual for the Committee to allow a suspension of the commencement of the payments into the sinking fund. The Committee refused to allow any suspension, and reduced the period of repayment for the water-works expenditure from sixty to fifty years.

THE CONTEST FOR THE DERWENT WATERSHED.

The Consolidated Bill before the Examiner.

The Nottinghamshire County Council having deposited a memorial complaining of non-compliance with the Standing Orders in the case of the Derwent Valley Water (Consolidated) Bill, which, as already reported, has been passed by the House of Commons, the allegations of the memorialists were considered by Mr. Campion, one of the Examiners, last Tuesday. The Bill, it will be remembered, provides for the constitution of a Joint Board, consisting of representatives of the Corporations of Derby, Leicester, Sheffield, and Nottingham, and the Derbyshire County Council; and opposition was offered to the Bill on the ground that the formation of the Board was an object of the Bill which ought, in conformity with the Standing Orders, to have been, but which had not been, stated in the notices. Mr. Soutter, Parliamentary Agent for the County Council, having argued in support of the allegations contained in the memorial, Mr. Cooper contended that the original notices given in respect of the Derby Bill provided for carrying out the works contemplated by the Corporation of Derby in conjunction with any County Council, Corporation, or Local Authority already, or which might be hereafter, constituted. The Joint Board proposed in the Consolidated Bill would, he said, be composed of representatives of four Corporations and one County Council, who would have power to carry out the works jointly. He argued that this was about as wide a notice as there could

possibly be of the intention to constitute a Joint Board, which it was foreseen from the very first would be the probable outcome of the three schemes, upon which a sum of £150,000 had been already spent. The Examiner, in giving his decision, said there could be no doubt that the creation of the Joint Board was a very important object of the Consolidated Bill; but he considered that the words relied upon in the Derby notice were much too general to cover the creation of such an authority. The consolidation of the Bills had brought about a set of circumstances which, even if the possibility of their arising had been contemplated, it would have been very difficult to provide for in the notice. Under these circumstances, he did not see how he could avoid sending the Bill before the Standing Orders Committee, and reporting that there had been non-compliance. He need not go into the question of whether the new scheme would be advantageous or disadvantageous to the ratepayers; that was a question of merits, with which he had nothing to do. But it was perfectly obvious that by the consolidation of the three Bills a new scheme had been introduced for the purpose of carrying out the powers originally sought, and that this scheme was an important object of the Bill, for which, from an Examiner's point of view, notice ought to have been given. Mr. Soutter also urged that there was further non-compliance by reason of the fact that there had been no notice to the ratepayers or governing bodies of the towns interested of the proposal contained in the new Bill to make the costs of the Corporations of Sheffield, Derby, and Leicester, in promoting their own Bills and opposing the others, part of the costs incurred by the Corporation of Nottingham in opposing the Sheffield Bill. The Examiner said that, under the rather peculiar circumstances of the case, he did not consider that the costs were an object of the Bill; and therefore he could not support this contention. But he was prepared to report that there had also been non-compliance in respect of the allegation that notice should have been given in regard to the clause of the Bill which would confer powers upon the Joint Board to borrow money on the security of their revenue and of the moneys receivable by them from the four Corporations. The Bill was accordingly sent to the Standing Orders Committee, with the report that the Standing Orders had not been complied with in respect of the two allegations sustained.

Extensions at the Wellington (Salop) Gas-Works.—Owing to the need of extensive additions to the plant for the production and storage of gas, the Wellington (Salop) Gas Company have decided to call up the balance of unissued 7 per cent. share capital, amounting to £9000, and purchase a piece of freehold land adjacent to the works.

Increase in the Price of Gas at Lutterworth.—An increase of 5d. per 1000 cubic feet in the price of gas at Lutterworth, making it 4s. 7d. net, has aroused much indignation among the consumers. An animated discussion took place on the subject at the meeting of the Parish Council yesterday week; and it was stated that, in view of the action of the Company, the Lamp Committee had cancelled an order for new lamps. The councillors seemed to think that the town could be lit up as well and cheaper with some other illuminant; and the Committee were instructed to investigate the matter.

Stoking Machinery for the Devonport Gas-Works.—The Directors of the Devonport Gas Company have decided to replace hand stoking in their retort-house by machine work, and have entrusted Sir William Arrol and Co., of Glasgow, with an order for a complete installation of the Arrol-Foulis machinery. In this case the charging-machines will be similar to those which Sir William Arrol and Co. have supplied to the South Metropolitan Gas Company, for their Vauxhall and Rotherhithe stations, and are now constructing for the Brighton Gas-Works. Each charging-machine has attached to it a small elevator, and is consequently capable of filling the hopper on the machine at any point in the length of the retort-house; the coal being stored in heaps along each side of the house.

The Gas Annuities of the Warrington Corporation.—The Bill promoted by the Warrington Corporation to enable them to carry out certain town improvements and water-works extensions, noticed in our "Parliamentary Intelligence," contained a clause to sanction the conversion of the existing perpetual annuities. When the Bill was before the House of Commons Committee, the Chairman of the Finance Committee of the Corporation (Mr. J. Shaw Green) explained that the annuities in question were part of the purchase-money for the gas-works, which were acquired under the Act of 1877. The Corporation could purchase the annuities at the maximum price of 25 years; but while many holders sold, others did not, and still refused to sell, although under the Local Act of 1890 the market price was substituted for the 25-year period. The Corporation now proposed that at the end of 25 years they could call upon the holders to sell at the present market value of 33½ years' purchase. They thought this only fair, as they were bound to provide a sinking fund to pay off the gas-works debt in sixty years. The Committee, however, refused the clause.

The Stourbridge Gas Undertaking.—The accounts of the Gas Department of the Stourbridge District Council for the past financial year have been published. They show that the revenue was £23,404, of which £18,205 was derived from sale of gas, and £4157 from residuals; the balance being the rental of meters and stoves. Of the total receipts for gas, £3327 was from prepayment meters, the business arising from which has grown considerably. The balance carried to the profit and loss account was £8308, to which has to be added £296, the profit on fittings account, making a total of £8604. Deducting the necessary amounts for interest on loans, and repayment of instalments of principal, there was left a surplus of £1783; being the net profit for the year. The quantity of gas made was 146,854,000 cubic feet. The net average price realized for the coke sold was 8s. 4¼d. per ton; for tar, ¾d. per gallon; and for sulphate, £6 14s. 5¼d. per ton. The borrowing powers exercised by the Council have been £125,200; and the total expenditure on the works (including purchase), £121,927—leaving a balance of £3273 in hand. The loans redeemed amount to £7569; leaving £117,630 to be repaid. The bulk of the money has been borrowed at 4 per cent. But at the end of the term of ten years from the time of the original loan, the Council have power of repayment; and they then hope to reborrow on advantageous terms the balance of the outstanding principal. For this reason they refused an offer to reduce the loan from 4 to 3½ per cent. a few years ago.

LEGAL INTELLIGENCE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Monday, June 26.

(*Before the* MASTER OF THE ROLLS, *the* PRESIDENT OF THE PROBATE DIVISION, *and Lord Justice* RIGBY.)

Hayes v. New Incandescent (Sunlight) Gas Lighting Company, Limited.

This was an appeal from a judgment of Mr. Justice Romer, given on Nov. 15, 1898, directing specific performance of an agreement by the defendant Company to sell the De Mare patents for £750. It was resisted on the ground that the nominal purchaser, Colonel Hayes, was really acting for the Welsbach Company, which was concealed from the defendant Company, who would not have entered into the contract had they known the real facts. (See "JOURNAL," Vol. LXXII., pp. 1107, 1168.)

Mr. NEVILLE, Q.C., Mr. BOUSFIELD, Q.C., and Mr. G. F. HART appeared for the appellants, and opened the appeal.

Mr. MOULTON, Q.C., who appeared with Mr. LEVETT, Q.C., and Mr. WALTER for the respondents, argued, in the face of an obviously adverse attitude on the part of the Bench, that there had been no misrepresentation on the part of the purchaser.

The case was then adjourned.

Tuesday, June 27.

Mr. MOULTON this morning continued his argument, amid repeated interruptions from the learned Judges, who were evidently indisposed to accept his view either of the facts or the law.

Mr. LEVETT followed on the same side. He said his case was an entirely different one from that put forward by the appellants. The real fact was that the appellants, believing the De Mare patents were of no value, sold them for a very good price. Then, finding—not that the patents were valuable in themselves, but that they might be useful for the purpose of attacking the Kern patents, which were purchased by the Welsbach Company—they regretted the bargain they had made, and tried in various ways to get out of it. He referred to several passages in the evidence, and submitted that the finding of the learned Judge was amply supported.

The MASTER OF THE ROLLS, without calling for a reply, said, speaking for himself, he did not find much, if anything, to quarrel with in the decision of the learned Judge, except that he had not addressed his mind to what appeared to him the turning-point of the case; and what he was going to say was rather a supplement to his judgment than differing from it. To his mind, the real question in the case might be put in the shortest and plainest language—Were the defendants tricked into signing this contract by people who were now seeking to take advantage of it? That was the sole question. If they were, specific performance was absolutely out of the question. It did not necessarily follow that rescission would be equally the necessary result; that would depend on the details. The facts were these: The person with whom they contracted, and the only person with whom the defendants came into contact, was a man named Tiano. Tiano had a principal behind him, who was named in one of his letters—a disclosed principal; and that person was Mr. Hayes, the plaintiff, who was now seeking to enforce against the defendant Company the contract contained in the letters which passed between Mr. Duncan, the Managing Director of the defendant Company and Tiano. There was not a word in the letters or the contract about Robinson or Kern, although there was something about an American Company. Mr. Robinson and Mr. Kern might or might not have been undisclosed principals. It was very likely they were. But the question to his mind was, How was the contract brought about which the Sunlight Company entered into with Tiano for Hayes, and possibly some undisclosed principals? Looking at the facts, Who sent Tiano to the defendant Company, and how did he come across him? Tiano was sent by Williams, and got his instructions from him. Who was Williams? He was one of the Directors of the rivals, and only important rivals of the Sunlight Company in this country. Then how did Williams get to him? He got to him through Mr. Möeller, the Managing Director of the rival Company. How did they get to him? Robinson went to him. Robinson and Kern had apparently bought up a number of patents called the Kern patents; and this particular patent, which was called the De Mare patent, although not worth much of itself except as regarded some collodion process, was of value to the holders of the Kern patents in this way, that the Kern patent might not have been usable without some litigation with the owners of the De Mare patent. At all events, those who were buying up the Kern patents thought it important to get control of the De Mare patents. Then, Who were the persons interested in the Kern patents at the date of the negotiation? Robinson and Kern certainly; but also this rival Company. It was absurd to say the rival Company were third parties, having nothing to do with it. They had an option to buy the Kern patents in this country; and it was vital to their interests that the Kern patent, or the owners of it, should get the control of the De Mare patent which was owned by the Sunlight Company. When Tiano went to Duncan to induce Duncan to part with the De Mare patent, Duncan told Tiano he did not care to sell it, and was not disposed to part with it unless he could be assured that it would not get into the hands of a rival. The whole scheme of getting it out of Duncan, in order that it might be vested in the rival Company, or that it should be under their control, was concealed from Duncan. By reason of this concealment, he was induced by Tiano to agree to sell the patent to Hayes. The right way to try this case was to ask oneself whether, if Duncan had known who was to have the control of the De Mare patent, and that it was to be in the hands of agents or nominees or trustees for their rivals, he would have dreamed of selling it. He obviously would not. That alone was not enough; but the reason for his not parting with it to such persons was explained to Tiano, and Tiano knew it perfectly well. Tiano was in the dark, and did not know all behind the scenes. He was put forward with uncommonly little knowledge of what he was about; but he knew that if Duncan had known the truth, he never would have sold the patent. Looking at the matter from this point of view—that Duncan was tricked by the Welsbach people into parting with the patent—it followed that specific performance was quite out of the question; and it also followed that, under these circumstances, it would be right to set

aside the contract. The decision of the Court, therefore, would be that the appeal must be allowed, and the judgment reversed. He would have to consider about the costs, as he understood there were some issues raised in the Court below which were not supported, which he should have to inquire about.

The PRESIDENT OF THE PROBATE DIVISION said he entirely agreed, and did not desire to add anything.

Lord Justice RIGBY said he also thought the case so plain that, although they were differing from the learned Judge, he did not desire to give a formal judgment.

A short discussion ensued as to any extra costs occasioned by the issues raised in the Court below; but ultimately

The MASTER OF THE ROLLS said the judgment must be reversed, and a decree made for rescission of the contract, with costs to the appellants both in this Court and below.

WEST RIDING QUARTER SESSIONS—Monday, June 26.

(*Before Sir* THOMAS BROOKE, *Chairman, and other Magistrates.*)

The Examination of the Ossett Gas Company's Accounts.

At the spring sitting of the Court, on the petition of the Ossett Corporation and two gas ratepayers, Mr. Charles Beevers, it will be remembered, was appointed to make an examination of the books of the Ossett Gas Company—the objects being (1) to ascertain whether or not any irregularity had occurred in connection with the undertaking, and (2) to secure a reduction in the price of gas, which was and still is 2s. 9d. per 1000 cubic feet. In the meantime, Mr. Beevers has made his report; and copies were now placed in the hands of the Magistrates.

From the report the following extracts are made: The Company's balance-sheet of Dec. 31, 1898, showed these liabilities: Sundry creditors, £956 6s.; consumers' deposits, £153; balance at credit of liquor £2 6s. 2d.; (1) balance at credit of the profit and loss account, £3492 6s. 6½d.; (2) balance at credit of the reserve fund account, £3889 1s. 4d.—total, £8493. Assets: Debtors for gas, &c., £4338 0s. 11d.; do. for coke and sundries, £548 7s.; stocks, coal, &c., £385 11s. 5d.; cash in hand, £164 19s. 7d.; cash at bankers, £488 4s. 2d.; (3) balance at debit of capital account, £2567 16s. 11½d. Total, £8493 0s. 0½d. Mr. Beevers says: "The items in this balance-sheet requiring investigation are those numbered 1, 2, and 3. No. 1. Profit and loss account, being accumulation of revenue to Dec. 31, 1898, £3492 6s. 6½d. (This is subject to payment of dividend at Dec. 31, 1898, £1730, leaving a balance of £1762 6s. 6½d.) No. 2. Reserve fund account: Balance at credit, Dec. 31, 1898, £3889 1s. 4d. No. 3. Capital account: Balance at debit, Dec. 31, 1898, £2567 16s. 11½d. From Jan. 1, 1889, to Dec. 31, 1898, I have carefully examined the expenditure on revenue and capital accounts, and find the following irregularities: There has been charged to revenue account the aggregate sum of £351 3s. 7d. for depreciation on meters, and the sum of £1056 11s. for income-tax. The latter should have been deducted from dividends. A rectification of these would leave the balance at credit of profit and loss account £3170 0s. 11½d., instead of £1762 6s. 6½d.; at debit of capital account £2919 0s. 6½d., instead of £2567 16s. 11½d.; and to be repaid by shareholders for income-tax, £1056 11s. The maximum dividends have been paid during the last ten years, although not always earned; the deficiency being obtained from the reserve fund. Exceptional expenditure on revenue account took place in the years 1891 and 1898—in the former year when £418 10s. was charged for renewal of purifiers, and in 1898 when a portion of the cost—£155 11s.—of two new boilers was also charged to revenue. But I do not think on the whole that any exception can be taken to the charges to revenue for the last ten years for repairs and maintenance of works, plant, mains, services, &c., on the ground of excess. Probably, if any fault is to be found with the Company in respect of expenditure on repairs and renewals, it is that they have not spent enough for proper maintenance of works, plant, &c.; the presumed object being to maintain maximum dividends. But this is a matter more for a gas expert than an accountant. In the statement marked 'A,' it will be observed that the repairs and maintenance are stated to include wages. In the Company's accounts the wages for repairs, &c., are not included under that head, but under the head of salaries and wages. The actual cost of repairs, &c., is not therefore ascertainable from the Company's published accounts. The reserve fund at Jan. 1, 1889, stood at £4537 1s., which was in excess of the authorized 10 per cent. on the nominal capital of the Company, £43,000. The amount at credit of this account is now, however (Dec. 31, 1898), £3889 1s. 4d.; the difference (with various additions from revenue) having gone to make up deficiencies in dividends. No portion of this fund has been invested as required by the Gas-Works Clauses Act, 1847."

Mr. WALTER BEVERLEY appeared for the petitioners; Mr. T. R. D. WRIGHT for the Company.

Mr. BEVERLEY said he desired to point out that, according to the report, during the last ten years the Company had paid out of revenue, interest on capital, and for depreciation of meters £351 3s. 7d. During the same period they had illegally paid the shareholders their dividends without making deductions in respect of income-tax—the sum of £1056 11s.; and these two items made £1407 14s. 7d., which showed that for the period named £147 14s. 9d. should be added to the annual profit. It would also be observed that the reserve fund had never been invested, which was contrary to the law. Mr. Beverley drew attention to the fact that the business of the Company had been a continually and largely increasing one; but, instead of letting the public have the benefit over and above their dividends, they had paid items out of revenue, among which was £975 4s. 4d. last year for repairs and maintenance. Proceeding, Mr. Beverley said that, at any rate, the income-tax was clearly wrong, and also the sum of £155 11s.; and these two items should be taken into consideration by the Court. What he had to submit was that his clients, as gas ratepayers, were entitled to see that the Acts of Parliament were carried out; and the report justified the position they had taken up in the petition presented. Mr. Beevers showed that such irregularities had existed during the past ten years, as justified the gas ratepayers in coming before the Court and asking for an inquiry. Under the circumstances, he thought they were right in asking for some reduction in the price of gas. He submitted that, under section 36, the Magistrates should put the costs of the present proceedings on the Company.

Mr. WRIGHT, on behalf of the Company, said that the proceedings were not so much for the benefit of the consumers as for the purpose of enabling the Corporation to ascertain the lowest figure at which they could purchase the gas undertaking. The condition precedent to the Court having power to make an order for a reduction in the price of gas was that the reserve fund should be invested. This decision was given in the case of the *Queen v. Recorder of Hanley*. He also contended that his friend was bound to stand by the accounts for the year previous to the inquiry being made, and was not entitled to deal with the former years. Taking Mr. Beevers' figures for the preceding year, they would only have a balance of £182 15s. 11d., which would not justify a reduction of 3d., inasmuch as 1d. produced only £272. As to an item which it was said should not have been charged to revenue, he had never yet come across an accountant who knew exactly what should be charged to capital and what to revenue. He submitted, however, that, according to the Act of 1871, they had authority for making such a charge on revenue; the form of accounts being exactly according to schedule. As to the income-tax, he admitted that they ought to have deducted it, but that would not for the past year affect the actual amount of profit as against the gas ratepayer.

The CHAIRMAN: Is not someone held responsible if a mistake has been made?

Mr. WRIGHT: They may be responsible to the shareholders.

The CHAIRMAN: But the shareholders had an addition to their income. I think the consumers have the right of action.

Mr. WRIGHT drew the attention of the Bench to the fact that Mr. Beevers asserted that the Company had not spent sufficient on repairs, as they might have been tempted to do after paying maximum dividends, and emphasized the fact mentioned in the report, that every year they had not earned their maximum dividend. Last year it had not been earned; and they took £53 from the reserve fund in order to bring the dividend up to the full amount.

Mr. BEVERLEY, in reply, said it that was not until the Company were found out that they commenced to put things in order. It seemed to him to be a gross case, and one which would never have been discovered had it not been for the Corporation.

The CHAIRMAN, in giving the decision of the Court, said he believed they were unanimously of the opinion that there had been ample ground for the institution of the inquiry. At the same time, in face of the strong dictum in the case of the *Queen v. Recorder of Hanley*, they did not think they were justified in ordering any reduction in the price of gas. As to costs, they were also of opinion that they were not justified in throwing any portion of them on to the petitioners. They had confined themselves very much to the fact that, after the payment of the maximum dividends, certain sums of money had been transferred to the shareholders. That might have been due to a mistake; but it had only been discovered in consequence of the petition. They considered the petition had been justified; and the costs must fall on the Company, including the expenses of the Accountant.

CROYDON POLICE COURT.—Wednesday, June 28.

(*Before the* MAYOR, DEPUTY-MAYOR, *and other Magistrates.*)

The Legality of Gas Companies' Unstamped Agreements.

To-day a case of considerable interest to Gas Companies came before the Croydon Magistrates. It was a summons taken out by the Crystal Palace District Gas Company against Mr. John Jefferee, a butcher, of Selhurst, for gas supplied at No. 4, Howbery Road, Thornton Heath, to the value of £3 18s. 9d.; for meter-rent, 1s. 6d.; and for the rent of a cooking-stove, 3s.—making a total of £4 3s. 3d.

The matter had been before the Bench on a previous occasion, when the defendant's Solicitor (Mr. W. Hood) asked for the production of the agreement. It was of the usual printed kind, as signed by all the consumers of gas in the Crystal Palace Company's district, but was unstamped. On this ground it was claimed that the Company's case could not be sustained; and owing to the importance of the matter, the hearing was adjourned for them to be legally represented.

Mr. BLYTHE now attended in support of the summons; Mr. W. HOOD appeared for the defendant.

Mr. BLYTHE claimed that by Act of Parliament exemption had been accorded to any agreement, letter, or memorandum made for, or relating to, the sale of any goods, wares, or merchandise. He cited as a precedent the case of *West Middlesex Water-Works Company v. Suicerkrop*, tried many years ago, which related to a contract to supply water. It was then held by Lord Tenterden that the agreement between the parties did not require stamping. He (Mr. Blythe) submitted that his case was an exactly analogous one; the only difference being that gas was a manufactured article.

The DEPUTY-MAYOR (Mr. C. G. Edridge) remarked that the agreement included the supply of a meter and cooking-stove—at least the rental for them. He asked how this could be divided. If an agreement comprehended two sets of things, it must be taken as a whole; one item could not be separated from the others.

Mr. HOOD contended that, without question, an agreement for the hire of a meter required a stamp.

Mr. BLYTHE, on the other hand, considered that the meter came within the meaning of "goods, wares, or merchandise."

Mr. HOOD: The case of *Helby v. Matthews* (1895), in the House of Lords, decides that.

Mr. BLYTHE adhered to his contention that the agreement, as a whole, had relation only to the supply of gas.

Mr. HOOD repeated his two points—first, that gas was not "goods, wares, or merchandise," and (if this were decided against him), secondly, that the fact of the agreement embodying something else—the hire of the meter—rendered it absolutely necessary that it should be stamped. For the out-and-out sale of a meter, he agreed that no stamp would be required.

Mr. BLYTHE argued that the meter was a necessary adjunct, without which the gas could not be supplied.

The DEPUTY-MAYOR alluded to the preciseness of the wording of the agreement; remarking that the supply of gas and the meter were the important parts of it. He asked if it was Mr. Blythe's argument that only main points, or the main point, really formed the agreement.

Mr. BLYTHE urged that there should be a liberal interpretation of the matter in the interests of trade. There had often been occasions of this kind in regard to the discussion of the letter of the law. The agreement was not entirely, perhaps, one for a sale; but, as a whole, it simply amounted to that. With some Gas Companies the meter-rent was charged in the price of the gas. If charged separately, it amounted practically to the same thing.

The DEPUTY-MAYOR asked Mr. Blythe whether, the matter being a serious one, he had been to the Inland Revenue authorities with any suggestions for adjudicating upon it?

Mr. BLYTHE said he had not. It did not enter the minds of himself or his senior to do so.

After some further argument,

Mr. HOOD pressed his point that the agreement must be taken in its entirety. Water, he admitted, was a commodity; but gas was neither tangible nor open to vision. He challenged his friend to produce a single authority where gas or electricity had been held as "goods, wares, or merchandise." He dwelt on the nature of the agreement, which bound the consumers just as a railway ticket purchased by a passenger, who thereby came under the rules and regulations. The defendant's contract embodied fourteen or fifteen different headings, under which the Company supplied the gas, meter, and stove; and he contended that it required a stamp.

The Company having no evidence to submit,

The MAYOR (Mr. G. J. Allen) said that as the agreement included the meter hire with the gas, and was unstamped, the Bench could not hold it admissible. The summons was, therefore, dismissed.

Mr. BLYTHE asked the Magistrates to state a case.

The CLERK: You must formulate your application, and state the point of law raised.

The DEPUTY-MAYOR remarked that it must be definitely understood that the Bench had not expressed any opinion on the "goods, wares, and merchandise" question.

Mr. HOOD asked for extra costs; but the Magistrates allowed only the usual guinea.

The Assessment of the Liverpool Water-Works.

At the Montgomery Quarter Sessions, at Newtown, last Thursday—Mr. Humphreys-Owen, M.P., presiding—the appeals of the Liverpool Corporation against the assessment of their water-works in the parishes of Llangyrnog, Hirnant, Pennant, and Llanrhaidr, in Denbighshire and Montgomeryshire, which had previously been before the Court, were again respited, as appeals concerning these parishes are to abide the decision of the Higher Courts in the Llanwyddyn appeal case, which it was also stated would probably be taken by the Corporation to the House of Lords.

Damage through a Defective Road.

At the Southwark County Court on Monday last week, before his Honour Judge Snagge, an action was brought by Dr. Gooding, of Heath Lodge, Blackheath, against the Southwark and Vauxhall Water Company, in respect of injuries to his brougham. Plaintiff said that while driving through Albert Road, Peckham, a portion of the crust of the roadway fell in, and the horse was thrown down and the brougham damaged. It was urged that the road gave way owing to a leak from defendants' main. His Honour found that there had been no breach of duty on the part of the Company, and said the plaintiff must console himself by the thought that he was a martyr in the cause of civilization, represented by the steam-roller, the Vestry, and the Water Company.

A Month's Imprisonment for Robbing A Prepayment Meter.

Albert Shaw, of West Melton, was charged at the Rotherham West Riding Police Court on Monday last week with having stolen 1s., the property of the Worth-upon-Dearne Gas Company. The facts were these: On June 21, Francis Smith, a shoemaker, on going to his shop, discovered the window had been forced, and the gas-meter broken open. A hammer was lying near the meter. He gave information to the police; and Police-constable Shaw made an examination of the shop, and discovered clog marks. He took plaster casts, and, having some suspicion, compared them with the prisoner's clogs. He then charged him with the offence. At first prisoner denied it; but he afterwards admitted its truth, confessing that he took twelve pennies out of the meter. Mr. George Wright, the Company's Manager, corroborated the evidence as to the damage to the meter and the pence missing. Shaw was sent to prison for one month.

Gas Stealing at Wigan.

R[illegible]ard Seddon, a well-known Lancashire footballer, was charged at Wigan last week with fraudulently using gas belonging to the Corporation. Two years ago the gas-meter was removed from Seddon's house; but on the 20th ult. an inspector noticed that the house was lighted up, and discovered that a connection between the street supply-pipe and that in the house had been effected by means of a piece of india-rubber piping. Defendant pleaded guilty, and was fined 40s. and the costs.

Wetherby Water Supply.—The Wetherby District Water Company, whose Bill passed the House of Lords on Monday last week, have found excellent water at Bardsey; and they anticipate supplying Wetherby within six months.

MISCELLANEOUS NEWS.

PRESENTATION TO MR. C. W. TANNER.

As briefly notified in a paragraph which appears in another part of the "JOURNAL," Mr. C. W. Tanner, who has been known to many of our readers as Chief Foreman at the Old Kent Road works of the South Metropolitan Gas Company, has, after a service of upwards of twenty-five years, retired to Worthing to seek a well-earned rest from his arduous labours. The opportunity was taken last Wednesday by the foremen and employees at the works to mark in a fitting manner their appreciation of Mr. Tanner's services. This took the form of an illuminated address, together with two solid oak frames containing the photographs of upwards of fifty foremen and leading hands, as well as a handsome cruet-stand.

The meeting was presided over by Mr. George Livesey, the Chairman of the Company; and there were present Mr. Robert Morton (Deputy-Chairman), Mr. Simpson Rostron (Director), and a large number of the engineers, officials, and workmen.

In making the presentation, the Chairman referred to Mr. Tanner's long and valued services to himself and to the Company. He briefly sketched his career from his first knowledge of him as a leading hand in the employ of Messrs. Docwra, to the present time. In emphasizing the example of his life and work, he laid stress upon the fact that although Mr. Tanner had been glad to accept work in his earlier days for as low a rate as 2s. 2d. a day, yet he always made it worth his employer's while to voluntarily pay him more. The difficulties were great in conscientiously fulfilling the duties of a foreman, for justice had not only to be done to the Company, but to the workmen; and the number of the latter who were assembled there that day was a proof, if proof were wanting, that Mr. Tanner had, in all his dealings, treated them with justice and fairness. He (the Chairman) added that above all other obligations was that of leading an upright God-fearing life; and Mr. Tanner had always striven to live up to such a standard. He concluded by expressing, on behalf of himself, his co-Directors, and every other officer and workman, the hope that Mr. Tanner would live many years to enjoy his retirement.

The address was as follows:—

South Metropolitan Gas Company,
Old Kent Road Works.

To C. W. TANNER, *Esqre.*

The Employees of the above beg to express their regret at your retirement from the post of Manager of the works. They can never forget the many kind actions for which they have to thank you. That you may, by God's will, be spared many years to enjoy your well-earned rest, is the earnest wish of your late colleagues.

(Signed on behalf of the employees)

H. FOX.	J. STANDING.	J. HART.
W. HARVEY.	J. KEELER.	M. SHEELEY.
J. COOLEY.	L. LINCOLN.	W. FLETCHER.
W. CUPIT.	F. SEAGE.	J. FARMER.

Mr. Tanner, in responding, said he felt that before him was the hardest task of his life—that was, to adequately express his feelings to the many kind friends who surrounded him that afternoon. He contrasted his leaving the Company with his first entering it, and related how, in the early days, when no one would tell him anything about the works, he had to find out everything for himself. He had been thankful for this ever since, for, instead of having to depend upon others, he had had to learn for himself, and thus increase at once his knowledge and his independence. He had always tried to do his duty, as he understood it, to man and master; and though he knew he had made mistakes, these arose not from intention but from errors in judgment from which no man was free. In conclusion, he could only once more thank one and all for their kindly thought and remembrance of him, which would ever be kept fresh by the many photographs of his old colleagues which accompanied their illuminated address.

The meeting closed with three hearty cheers.

NOTTINGHAM CORPORATION GAS SUPPLY.

Annual Report and Accounts.

We have received from the Engineer and General Manager of the Nottingham Corporation Gas-Works (Mr. W. R. Chester) the reports and accounts referring to his Department for the year ending the 31st of March, which came before the City Council last Thursday.

The Gas Committee report that, although the weather during the past winter was exceedingly mild, the consumption of gas nevertheless increased by 29,014,700 cubic feet; the total quantity sent out being 1,617,055,700 cubic feet, compared with 1,588,041,000 cubic feet in 1897-8. The Committee had to pay £3101 more for coal than in the previous year; and they say the outlook for the current year is still more unfavourable. The total receipts for residuals increased by £1024. The amount realized from the sale of gas was £194,488. In 1897-8 it was £190,891; being an increase of £3597. During the past year the Committee carried out extensive renewals to the acid plant at the Giltbrook Chemical Works, the cost of which (£2259) was paid out of the depreciation and insurance fund account accumulated for the purpose. The net profit for the year was £24,839. Of this sum, £24,000 would be paid over to the Finance Committee by order of the Council in aid of the expenditure in the municipal year, and the balance carried to the annuity redemption fund account.

Mr. Chester's report deals with the works and distribution system. He begins by stating that renewals and extensions had to be provided for out of revenue; thus lessening the net receipts for this product. The average illuminating power of the gas for the year was 18·94 candles; and the sulphur compounds were kept down to 24·79 grains of sulphur per 100 cubic feet of gas. With regard to the distribution department, Mr. Chester reports that the total mileage of mains is 301·51; there having been 5·4 miles added to the canalization during the year. The number of meters

fixed to the 31st of March (including 359 lamp meters), was 44,664; being an increase of 1540 on the previous year. Of the total, 42,095 belong to the Gas Department, and 2569 to the consumers. The demand continues for prepayment meters. At the end of the financial year, 6547 of these meters were in operation—an increase of 1178. The orders and calls for attention of various kinds from consumers were 39,942, against 40,260 in the preceding year. There were 1951 new services laid, compared with 2348 in 1897-8. The application of gas for trade and domestic purposes other than for lighting continues to increase. There are at present in use about 5330 gas cooking-stoves, 5860 gas-fires, and 421 gas-engines, besides a very large number of other appliances of almost every description, which have not been numbered. Of the 5330 cookers in use, 4984 are rented from the Department.

The accounts accompanying the reports show that the total amount received on capital account to the 31st of March last was £1,033,333; and the total expenditure was £1,031,709, of which £6941 was spent during the year. Deducting £3000 loans repaid, and £500 transferred from the net revenue account for depreciation of gas-stoves, there is left a sum of £1,028,209, and an unexpended balance of £5124. The revenue account shows that the sale of gas produced £194,488; the rental of meters and stoves, £8450; and the sale of residual products, £45,024; sundries making up a total of £252,122. The manufacture of gas cost £135,603; distribution, £24,862; and management, £6808—the total expenditure being £178,720. The balance carried to the profit and loss account is £73,402. Of this sum, £43,570 is required for interest and annuities; and after satisfying other demands, the net balance is left of £24,839, as above stated.

When the accounts were presented, their adoption was moved by Alderman Barber, the Chairman of the Gas Committee. In order to save time, he read an account regarding the condition of the Gas Department which had been prepared by the Committee for the information of the Council. It stated that the amount now standing to the credit of the capital account in the books of the department was £1,033,333, as against £884,419 in the year 1889—an increase of £148,914. This increase, however, included £71,864 discount on the issue of consolidated stock, which sum was brought into the accounts for the first time in 1896. The capital increase in expenditure on capital account during these years was therefore £77,050, or 8·7 per cent. The coal carbonized had increased from 130,564 tons in 1889 to 167,011 tons in 1899, or 27·9 per cent. In other words, the business increased by 28 per cent., while the capital expenditure had only advanced by 8¾ per cent. In 1889 the capital employed was £6 15s. 6d. per ton of coal carbonized; this year it was £6 3s. 9d. Thus, though the total sum now employed on capital account was greater than in 1889, the expenditure per unit of business done—*i.e.*, per ton of coal carbonized—was materially less. The effect of this diminution in capital per unit of business was best shown by a reference to the interest charges. The cost for interest on capital expended was 6s. 4·39d. per ton of coal carbonized in 1889, as against 5s. 2·61d. in 1899, or a diminution of 1s. 1·78d.—say, 1s. 1¾d. per ton. This diminished cost for interest of 1s. 1¾d. per ton on 167,011 tons represented a saving of £9568 per annum, or in other words, if the capital expenditure per unit of business had been maintained, the charge for interest would be £9568 per annum more than was now required. Alderman Ford seconded the motion, which was unanimously adopted.

RAMSGATE CORPORATION GAS AND WATER SUPPLY.

The Past Year's Working.

At the Meeting of the Ramsgate Town Council last Wednesday, the Chairman of the Gas and Water Committee (Mr. C. J. Gwyn, J.P.) presented the accounts of the department for the year ending the 31st of March. In doing so, he remarked that it was fortunately possible, especially in relation to the gas undertaking, to record a manifest improvement in important items on the credit side of the balance-sheet. For the year 1897-8, with no cold weather necessitating the manufacture of an increased quantity of gas, and with the miserable prices prevalent for all classes of residuals, the Committee had, in common with other similar bodies, to report a very moderate increase on the returns of former years. This year, although again no assistance had been afforded by the climatic conditions of the past winter, the Committee nevertheless had the greater satisfaction of reporting a substantial advance in the bulk of gas produced, as well as a welcome addition to the amount received for residuals, as shown by the returns for the principal commodities—coke and sulphate of ammonia. The total quantity of gas made during the past year was 197,365,000 cubic feet, of which 181,062,000 cubic feet had been sold and used on the works; leaving 16,303,000 cubic feet, or 8·26 per cent. unaccounted for, as compared with 8·91 per cent. in the previous year. The coal carbonized was 17,311 tons; the gas made per ton of coal, 11,401 cubic feet; and the gas sold per ton, 10,288 cubic feet. The coke made was 10,386 tons 12 cwt., of which 2435 tons 12 cwt. was used in manufacture. The sulphate of ammonia made was 155⅜ tons, equal to 20·05 lbs. per ton of coal carbonized. These excellent results were due to the complete apparatus fixed up a short time since. The net results for the year, as contained in the statement of the working (under the supervision of Mr. W. A. Valon) showed that the profits on coke and other residuals equalled 51·38 per cent.—that was to say, the Committee received back on the net cost of the coal more than one half. The coal cost last year 14s. 7·02d. per ton; and the return was 7s. 5·94d. per ton—making the net cost 7s. 1·08d. per ton. Turning to the revenue account, the total expenses of manufacture, rents, rates and taxes, and management amounted to £23,602, against £22,538 in 1897-8—an increase of £1064; but as they had received from the sale of gas £1503 more than in the preceding year, and residuals had given an additional £1200, the Committee were really enabled to show an increase of £1676 in the gross profit. On the profit and loss account there was a balance of net profit of £2816 to deal with, against £1779 this time last year. This balance was arrived at after having liquidated the balance of £712 due to the expenditure caused by fitting up the whole of the lamps in the town with incandescent burners, which previously stood to a suspense account. Coming to the accounts of the water undertaking, they were not without some interesting features. The gross amount received for water (less bad debts and empty houses), rent of meters, &c., had increased by £370—viz., from £10,249 to £10,619. On the other side, the revenue account showed an extra expenditure of £233. But it was satisfactory to notice that the fuel account for raising the increased quantity of water was £73 less than in the previous year. Turning to the profit and loss account, the result was to leave in the Committee's hands a net balance of £1133, or £639 more than this time last year. In dealing with these net profits, it was incumbent upon the Committee to recoup, by reasonable annual instalments, the amounts transferred from the reserve funds of both undertakings in aid of their respective capital accounts, so that, quoting from the words of the recent Provisional Order dealing with the application of profits, "if that fund is at any time reduced it may thereafter be again restored to the said sum, and so from time to time as often as such reduction happens." While carrying out this duty, the Committee had still a very satisfactory amount to dispose of in any way which might be decided upon by the Council. After placing £345 to the reserve fund of the gas undertaking, bringing it up to £4000, they had a net balance of £2471, against £1779 last year, or an increase of £692. In dealing with the water undertaking, after carrying £472 to the reserve fund, bringing it up to £3400, the net balance remaining was £651, against £494 in 1897-8, or an increase of £157. The Committee had, from the two undertakings, a sum of £3123 to be dealt with by the Council as the profits for the year. The total already paid over in aid of the rates by these departments had been: Gas, £30,159; water, £4997—together, £35,156. Mr. Gwyn made a few further observations, and then moved the adoption of his report. Alderman Sykes seconded. The report gave rise to a short discussion. Mr. Barnett remarked that it was suggested to dispose of the £712 in respect of the fitting up of the incandescent light in the town, while £345 was to be put to the reserve fund. He thought half of this amount might be employed in the reduction of the rates; or he would prefer that it should go to reducing by half, or to abolishing entirely, the charge for meters, so as to encourage the sale of gas. Mr. Gwyn said he did not think the suggestions of the Committee were at all unreasonable. Even after defraying the cost of the installation of the incandescent burners, there was £700 more than they had last year to deal with. They would not have this item of expenditure another year. Mr. Barnett's next suggestion was that the account for incandescent lighting should be paid off, and the whole amount of the net profits be applied in relief of the rates, leaving nothing to go to the reserve fund. Mr. Gwyn pointed out that the Corporation were bound by Act of Parliament to replace the reserve fund by not less than one-tenth. With regard to the charge for meters, the Committee had had the matter before them many times, and it had also received considerable attention from gas companies; and the whole of the experience of those who had abolished or reduced meter-rents was dead against Mr. Barnett's argument. This gentleman then moved an amendment to the effect that meter-rents be reduced by one-half; but he subsequently withdrew it, and moved instead that the whole of the balance should be handed over to the district rate. On its being pointed out to him, however, that the payment must be made to the reserve fund, he withdrew his second proposition, and Mr. Gwyn's motion was carried *nem. con.*

COLNE CORPORATION GAS SUPPLY.

The Past Year's Working of the Gas Department.

A Special Meeting of the Colne Town Council was held last Thursday, when the annual estimates were introduced by Mr. Hewitt. Referring to the Gas Department, he stated that the estimated profit was put at £2000; but they were in the happy position that the Gas Committee were actually able to hand over £2902, in addition to the fact that they had not charged for the street lighting (£1250). This was a most satisfactory state of things for the Committee and the management. It spoke extremely well for the gentleman who used to be with them (Mr. H. Simmonds), and for their present Gas Engineer, Mr. Fred Thorpe, for the way in which he had conducted the work during the year. It had been a great relief to the Finance Committee. The actual profit from the gas-works was £4120. The total estimate for the current year was £11,414, and the profit asked from the Gas Committee was £1000, making no allowance for any outlay on street lighting. The Mayor (Alderman Knight) expressed the pleasure of the Council at hearing so satisfactory a statement. The Gas Department had kept well up to the standard; and everything was in splendid working order. The successful working of the department, as Mr. Hewitt had said, spoke well for Mr. Thorpe and his staff, and also for the gentleman who had preceded him. The town was to be congratulated from every point of view, as its finances were in a very favourable position. The district rate was fixed, and the meeting concluded.

The following are the returns of the gas undertaking for the past financial year: The sale of gas, including that used for public lighting, produced £15,748; being £1328 more than in the previous year. There were increases on the meter and stove rents of £43; on coke and tar, £191; and on sulphate of ammonia, £374. There was a decrease of £319 in the expenditure on the maintenance of works, and of £285 for distribution. Rates and taxes were £429 more. A sum of £3805 was spent on capital account, which now reaches £98,309; but £8700 of this has been repaid. The total income was £20,848, against £18,896—an increase of £1952. The expenditure amounted to £12,771, against £12,620—a rise of £151. This left a gross profit of £8077, against £6276. After providing for interest and sinking fund (£3956), the net profit last year was £4121, against £2282 in the preceding year; being equal to 8½d. per 1000 cubic feet of gas made. Of this amount £2500 is carried to the district fund, and the balance to a general reserve fund. The quantity of gas manufactured was 119,050,000 cubic feet—an increase of 6,247,000 cubic feet, or 5·53 per cent. The bulk of coal carbonized was 10,359 tons; of cannel, 266 tons—making a total of 10,625 tons, against 10,000 tons in the previous year. The gas sold was 112,558,000 cubic feet; the unaccounted-for gas amounting to 6,492,000 cubic feet, or 5·45 per cent., against 8·15 per cent. The amount of gas used on the works was 1,357,000 cubic feet, against 2,300,000 cubic feet in 1897-8. The number of public lamps was increased from 569 to 585; of cookers, from 580 to 775; and of prepayment meters, from 1018 to 1466. The illuminating power of the gas averaged 17·49 candles. The selling price of gas is 3s. per 1000 cubic

feet, less 5 per cent.; and it is supplied to the public lamps and the Corporation departments at net cost. The supply through prepayment meters is at 3s. 4d. per 1000 cubic feet.

PLYMOUTH AND STONEHOUSE GAS COMPANY.

The Annual Meeting of this Company was held last Thursday—Mr. G. HENDERSON in the chair.

The Directors in their report stated that, notwithstanding the advance in the price of coals and freights and the loss on residuals, the revenue for the past year shows a slight increase. Payment of the usual dividends - 6½ per cent. on the ordinary stock, 9s. 9d. per share on the additional shares, and 9s. 3d. per share on the new shares created under the Act of 1879—was recommended; leaving a balance of £7855 to be carried forward. The Directors reported that they had completed their negotiations with Messrs. Willey and Co., of Exeter, and Messrs. Richmond and Co., of London, for the introduction of penny-in-the-slot meters and for letting gas cooking-stoves on hire. The system was inaugurated in July last. The results had been most satisfactory; there being at the end of March more than 2060 slot meters and 876 cooking-stoves in use. The accounts accompanying the report showed that during the past year the expenditure on capital account had been increased by £43,033, of which £15,000 was for land, £12,210 for new buildings and manufacturing plant, and £16,473 for stoves and automatic meters. On revenue account the receipts were £87,789, as compared with £86,901 in the year 1897-8; while the expenditure was £75,724, against £73,761. The balance carried to the profit and loss account was £12,064.

The CHAIRMAN, in moving the adoption of the report and accounts, said the extremely hot weather during last summer, followed by a very mild winter, somewhat restricted the output of gas, and they had not had the usual annual increase which hitherto they had experienced. The result of last year's working was pretty much the same as the previous year's. The total receipts were £87,789—an increase of £887; and the expenditure was £75,724, which included £1211 for parliamentary expenses. The amount carried to the credit of profit and loss was £12,064; being less than last year by about £1085. But for the parliamentary expenses, it would have been slightly in excess. Last July the Company introduced "penny-in-the-slot" meters, and also began to let gas-stoves out on hire to ordinary consumers. At the end of their financial year they had 2000 slot meters and 876 cooking-stoves in use, the supply being at the rate of 250 per month for meters and 100 per month for stoves. The demand for these still continued, and since the close of the financial year the same proportion had been maintained. Altogether, 2940 slot meters and 1200 stoves were now fixed. As a result of their departure in this direction, he thought they might look forward to a considerable increase in the consumption of gas during the current year. Outside work had been extensively carried on. They had put in 494 new services (which really meant this number of new consumers), and had renewed 296 old services. This had been done out of revenue. The meters in use on March 31 were 12,613; being an increase of 489 during the year. They had taken up 4749 yards of old mains, and substituted larger ones; and 2550 yards of mains had been laid in new districts. All this involved considerable expense. But they had felt it to be the right thing to charge it against revenue. They were now getting a better price for their sulphate and tar; and he thought during the year they would realize a larger sum from residuals. The Chairman went on to refer to a controversy which took place after the last annual meeting respecting the action of the Parliamentary Committee of the Plymouth Town Council in opposing the Company's Bill in the session of 1898. Alderman Radford in that controversy accused him (Mr. Henderson) of making an ignorant and unjustifiable statement. If this meant anything at all, it meant that he deliberately and knowingly stated to the shareholders what was not true; and a more reckless, unwarranted, and malicious accusation could not possibly have been made. He had been in the service of the Company from its formation in 1844—probably before Alderman Radford was born—and if on any single occasion he had made statements to the shareholders in order to mislead them, or stated what was not true, he should consider himself utterly unworthy to occupy the position of Chairman of the Company. Continuing, he said he hoped next year the Directors would be able to present to the shareholders a more favourable balance-sheet. They were in a thoroughly sound state, and might look forward with confidence to the maintenance of their dividends.

Mr. J. A. BELLAMY seconded the motion, and it was carried, as was also a resolution approving of the payment of the dividends.

Mr. BELLAMY, in moving the re-election of the retiring Directors, said there was not the slightest doubt that the prosperity of the Company would increase. If during the past year, with coals and freights about 25 per cent. higher than they had been accustomed to pay, they had succeeded in presenting the balance-sheet before them that day, and had been able to declare a maximum dividend with the price of gas at 1s. 9d. per 1000 cubic feet, he ventured to predict that their prosperity was going forward by leaps and bounds.

The motion was agreed to.

On the conclusion of the ordinary business, the meeting was made special to authorize the issue of further capital.

The CHAIRMAN moved for authority to issue, under the provisions of the Company's Act of 1894, £17,360, the balance of the ordinary stock, and also £20,000 of debenture stock. He explained that the Company had had to buy the neighbouring tannery, which was the subject of litigation, and cost £15,000. The expenses the Company were put to in connection with the legal proceedings amounted to £7000 or £8000, and the slot-meter business involved increased expenditure of capital. He did not see why they should not get all the money they wanted at 3 per cent.

Mr. BELLAMY seconded the motion, which was agreed to, as were formal resolutions entitling the new stock to rank with former issues for dividend.

The meeting terminated with thanks to the Directors and officials of the Company.

ELECTRIC LIGHTING NOTES.

Mr. T. Dixon, the Town Clerk of Chelmsford, has received a letter from the Secretary of the Chelmsford Electric Lighting Company, declining to accept the offer of the Corporation to purchase the lighting undertaking at £24,000. The Company offered in the first instance to sell for £41,000; but the Council called in an expert, and, acting on his advice, they said they were prepared to give £24,000.

A comparative statement as to the working of the electricity undertaking in the years ending March, 1898, and March last was submitted to the Lancaster Town Council last Wednesday. It showed that the quantity of current supplied to the public lamps and private consumers and used at the works in 1898 was 150,519 units, and in 1899 209,947 units. The expenditure in 1898 amounted to £1335, or 2·11d. per unit, and in 1899 to £1682, or 1·92d. per unit. The income for 1899 was £4007, against £2901 in 1898.

At the meeting of the Bath Town Council last Thursday, the Electric Lighting Committee recommended that application should be made to the Local Government Board for power to borrow £26,000 for electric lighting purposes. Alderman Taylor, in moving the adoption of the report, stated that the course recommended was absolutely necessary. They had spent in connection with the electric light works £62,760, and they had sanction to borrow £55,275. In extras, necessaries, and other things, they had exceeded their powers by £7395—this forming part of the £26,000. The extensions of mains accounted for a large portion of £16,704; while £2000 was asked for in connection with the carriage and storage of coal. The report was adopted.

A Committee of the Nuneaton District Council have been looking into the question of the purchase of the local electric lighting works; and in their recommendations they show they have not been deceived, and that they have no desire to deceive others. They recommend that, in the event of the Council deciding to purchase, the price should not exceed £5000, and that a town's meeting should be held to consider the matter. But they also wish it to be clearly understood that, for a certain period, should the works be purchased, "there would probably be a loss which would have to be charged on the rates." Notwithstanding this it was decided to make an offer to the Company in accordance with the Committee's recommendation. The undertaking cannot be a very promising one; seeing that the Company have already offered to dispose of their works at the amount of capital expended *plus* £500—practically, £5500.

A Local Government Board inquiry was held last Thursday at Southport, by Mr. Charles Perrin, into an application by the Town Council for power to borrow £55,000 for the purposes of electric lighting. The Town Clerk (Dr. J. Davies Williams) stated that the greater portion of the money was required for the extension of the electrical plant for lighting purposes. This would absorb about £43,000; and the remaining £12,000 was to provide power for working the tramways. Mr. C. D. Taite, the Electrical Engineer, stated that the Corporation possessed plant of a capacity of 1275 kilowatts. They proposed to dispose of three small machines forming the original installation, and substitute one large 600 kilowatt alternator. The net profit for the year ending March, 1898, was £640, and for the past year £2027. The maximum load last year increased by 187 kilowatts; and as the applications were coming in rapidly, they expected a further increase. The Inspector subsequently visited the works.

The annual report of the Electricity Committee of the Manchester Corporation will be submitted to the Council to-morrow. With some gratification, the Committee announce that during the year there was an increase of 44 per cent. in the output of electricity, amounting to 5,633,534 units. The number of consumers on March 31 last was 2570; being an increase of 515 during the year. The total length of mains now laid is 74 miles 217 yards; being an increase of 28 miles 1075 yards. The net profit, after defraying all charges for cost of production, &c., providing for renewals, sinking fund, and interest on loans, amounts to £17,188. The Committee propose at an early date to ask the consent of the City Council to further reduce the charges for electricity; provision for such reduction having been made in the current year's estimates. To meet the ever-increasing demand, new mains are being laid in various parts of the city, and at Moss Side, Levenshulme, and Withington. It has further been decided to equip a new generating station on the Bloom Street site, which adjoins the present works; and an order has recently been placed with the Westinghouse Electric Company, Limited, for the supply and erection of four 1800 kilowatt generators. The necessary buildings, boilers, pumps, pipes, &c., will be put in hand forthwith; and it is expected that the whole of the plant will be available for use by the autumn of 1900. In order to carry out the various extensions, further borrowing powers will be required; and, in accordance with a resolution of the City Council, application has been made to the Local Government Board for sanction to raise an additional sum of £500,000. Agreements have recently been entered into with the District Councils of Denton, Droylesden, and Heaton Norris for the supply of electricity in their respective districts.

Our readers are aware that Mr. W. A. Valon is preparing a report on the advisability of the Ramsgate Corporation carrying out a scheme of electric lighting. At the meeting of the Gas and Water Committee of the Corporation last Wednesday, the Town Clerk (Mr. W. A. Hubbard) read a letter he had received from the Solicitors of the Isle of Thanet Light Railway Company (Messrs. Webb), giving notice of the intention of the promoters, in the event of their receiving the sanction of the Corporation, to apply to the Board of Trade for powers to supply electricity for lighting purposes in the borough. They pointed out that arrangements had been made with the Margate Corporation to take over their Electric Lighting Order, and the Company had also obtained a Provisional Order for the lighting of Broadstairs, Westgate, and Birchington. They were therefore in a better position than anyone else to undertake electric lighting in Ramsgate, and to supply the light to the Corporation at a much lower rate than the latter could produce it for, having regard to the fact that the Company would be producing energy on a considerable scale for their tramways. Mr. Valon remarked that those members of the Corporation to whom he had spoken seemed to be of opinion that it should be their business to carry out a scheme. He disagreed altogether with the statement in the letter that, owing to the fact that the Company were producing current for traction purposes, they could generate electricity for lighting at a much lower

cost. The two kinds were prepared in quite different ways, and what would do for traction would not do for lighting, and *vice versâ*. Asked when his report was likely to be presented, Mr. Valon replied that it would be ready in another month. This was a matter which must not be taken up lightly; and he had spent considerable time in getting reliable information. It was eventually resolved that a letter should be sent to Messrs. Webb, stating that the Gas and Water Committee, being a Committee of the whole Council, were unanimous in recommending to the Corporation the adoption of the Electric Lighting Order themselves.

THE SUPPLY OF WATER IN THE EAST LONDON DISTRICT.

The Company's Improvement Scheme Rejected.

It will be seen by our "Parliamentary Intelligence" that the Bill promoted by the East London Water Company to enable them to construct additional reservoirs in the Lea Valley and draw a further quantity of water from the Thames, has been rejected by a Committee of the House of Lords, after having successfully passed the Commons. In view of this result, the Chairman of the Company (Colonel Lockwood, M.P.) has addressed the following letter to the Secretary of the Local Government Board, and copies have been sent to the Press:—

The East London Water-Works Company, as responsible for the supply of water to the East-end of London, introduced, as you know, a Bill this session to enable them to ensure a constant supply of water to their district, in all contingencies that could reasonably be foreseen. That Bill has, however, been rejected, mainly at the instance of the London County Council, by a Committee of the House of Lords, after the Bill had been discussed and approved in the House of Commons and threshed out and passed by a Committee of that House. The Bill had for its main object the completion of the scheme of storage reservoirs intended to store the surplus waters of the Lea running to waste in times of plenty, so as to be available for use in times of drought, and to meet the rapidly increasing demand for water in their district, especially in Essex. This scheme of storage reservoirs was approved by Lord Balfour's Commission, after hearing the best available evidence, and all that the London County Council could urge against it. Four of these reservoirs, instalments of the scheme, were approved and sanctioned by Parliament in 1894 and 1897, though strenuously opposed by the London County Council. It was further stated authoritatively that the completion of the scheme would not prejudice the questions submitted to Lord Llandaff's Commission. The necessity and practicability of the scheme were recommended and strongly supported before the Committee by the most experienced Water Engineers of the day—*e.g.*, by Sir Frederick Bramwell, Mr. Mansergh, Mr. Holt, Mr. Eaton, and by the Company's responsible adviser, Mr. Bryan. Yet, in the face of this, the London County Council urged the rejection of the measure, though the Bill contained the auction clauses and the sinking-fund clause. The Company introduced this Bill for the foregoing object, and to provide for water being taken from the Thames in times of emergency, with the consent of the Local Government Board, and under provisions for safeguarding that river agreed with, and approved by, the Thames Conservators. The Company do not for a moment question the decision of the Committee, but desire to put these facts before you and on record now, so that, if difficulty arises hereafter, the responsibility may not rest with the Company, who have by the rejection of their Bill been stopped from proceeding with a scheme which, in their opinion, would ensure a constant supply of water, and which they are advised is necessary, and could have been carried out without injury to any body or interest.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Edinburgh and Leith Gas Commissioners occupied less than three minutes on Monday for the transaction of their monthly business. There was nothing to be done except the approval of minutes and the formal remit of the accounts for the year to the Finance and Law Committee. In the minutes of the Works Committee was given the monthly report by Mr. Herring, the Engineer, from which it appeared that the output of gas during the month of May was 96,441,000 cubic feet, and was an increase of 9,190,000 cubic feet over the same period of 1898. During the month 96 new cookers were fixed; making a total of 3265 cookers and gas-fires now on hire. The Finance and Law Committee reported that during the two months preceding Whit-Sunday the gas-rental amounted to £66,077, which was £3584 over the same period of 1898. The accounts for the year were submitted by Mr. Gibb, the Treasurer, and were sent to the Committee without remark.

The "Scotsman" of Monday reported that the previous day an unusual occurrence happened in Old Greyfriars' Church, Edinburgh. As the congregation were assembling for the morning service, there was a distinct smell of gas. That part of the church being somewhat darkened by the stained-glass windows, there were lights at the side of the pulpit. The escape continuing, the gas was turned off and the ventilators in the roof of the building were opened. The Minister of the church, the Rev. Dr. Glasse, began the service, but the smell of gas seemed to increase rather than diminish, and the congregation were obviously feeling uncomfortable. In the course of a few minutes from the commencement of the service, two or three persons were seized with illness from gas poisoning, and had to be assisted out of the church. On getting into the open air, they soon recovered. The leakage appeared to be considerable, for the smell reached even to the outside of the building. It being impossible in the circumstances to continue the service, Dr. Glasse dismissed the congregation. Mr. Herring, the Engineer to the Gas Commission, has prepared the following report upon the subject: "I have had the matter of the escape of gas at Greyfriars' Church fully investigated; and the results may be of interest, and the lesson they convey of some profit to gas consumers. After the Gas Commissioners' man attended at the church on Sunday, about 12 o'clock, he found that the gas had been turned off at the meter; and as the smell was considerably less than it had been, matters were allowed to stand as they were until a full investigation could be made on Monday, on which day I had the whole of the gas fittings and pipes in the church tested for soundness, with the result that they were found to be perfectly tight, and that no escape whatever existed in any of the pipes or fittings. Under the circumstances,

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 24.

Issue.	Share.	When ex-Dividend.	Dividend or Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 13	10½	Alliance & Dublin 10 p. c.	21½—22½	..	4 13 4
100,000	10	,,	7½	Do. 7 p. c.	15½—16½	..	4 10 11
300,000	100	Jan. 3	5	Australian 5 p. c. Deb. .	104—106	..	4 14 4
200,000	5	May 12	6	Bombay, Ltd. . . .	6½—7	..	4 5 9
40,000	5	,,	6	Do. New, £4 paid .	4½—4¾	..	5 1 1
880,000	Stk.	Feb. 24	12	Brentford Consolidated	275—280	..	4 5 9
240,000	,,	,,	9	Do. New . . .	215—220	..	4 1 10
50,000	,,	,,	5	Do. 5 p. c. Pref. .	140—145	..	3 9 0
159,375	,,	June 15	4	Do. 4 p. c. Deb.. .	126—130	..	3 1 7
220,000	Stk.	Mar. 29	11½	Brighton & Hove Orig. .	265—270	..	4 5 2
226,320	,,	,,	8½	Do. A. Ord. Stk. .	194—197	..	4 6 4
973,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max. .	125—130	..	3 16 11
420,000	20	Mar. 29	10	British	46—48	..	4 3 4
50,000	10	Feb. 24	12	Bromley, Ord. 10 p. c. .	25—27	..	4 8 11
75,000	10	,,	9	Do. 7 p. c. . . .	20—22	..	4 1 10
500,000	10	Apl. 27	6	Buenos Ayres (New) Ltd.	10—10¼	..	5 14 3
220,000	Stk.	June 29	4	Do. 4 p. c. Deb. .	100—102*	−1	3 18 5
150,000	20	Mar. 10	8½	Cagliari, Ltd. . . .	28—29	..	5 13 10
100,000	10	June 1	7½	Cape Town & Dis., Ltd.	13—14	..	5 7 2
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	56—58	..	5 3 5
550,000	Stk.	Apl 13	13½	Commercial Old Stock .	314—319	+2	4 4 8
200,750	,,	,,	10½	Do. New do. .	245—250	..	4 4 0
200,750	,,	June 15	4½	Do. 4½ p. c. Deb. .	143—148	..	3 0 10
800,000	Stk.	June 15	10	Continental Union, Ltd.	190—195	..	5 2 7
200,000	,,	,,	7	Do. 7 p. c. Pref.. .	182—187	..	3 14 10
51,600	Stk	Feb. 24	14	Croydon A 10 p. c. . .	—	—	—
168,400	,,	,,	11	Do. B 7 p. c. . .	—	—	—
555,000	Stk.	Feb. 24	5½	Crystal Palace Ord. 5 p. c.	135—140	..	3 15 0
60,000	,,	,,	5	Do. 5 p. c. Pref. .	140—145	..	3 9 0
486,690	10	Jan. 27	11	European, Ltd. . . .	23—24	..	4 11 8
854,060	10	,,	11	Do. £7 10s. paid .	17—18	..	4 11 9
14,993,075	Stk.	Feb. 10	4⅞	Gas-light and Coke	4 p. c. Ord. . .	108—110	−1	4 9 1
					3½ p. c. max. . .	99—101	−1	3 9 4
					4 p. c. Con. Pref.	126—128	−1	3 2 6
					3 p. c. Con. Deb.	99—101	..	2 19 5
3,799,735	,,	,,	4	Hongkong & China, Ltd.	13½—14½	..	5 10 4
3,843,975	,,	June	3	Imperial Continental .	225—228	..	4 7 9
70,000	10	May 31	8	Do. 3½ p. c. Deb. Red.	102—105	..	3 6 8
3,800,000	Stk.	May 13	10	Malta & Medn., Ltd. .	5—5½	..	5 9 1
478,600	Stk.	Feb. 10	3½	Met. of 5 p. c. Deb.	112—114	..	4 7 9
75,000	5	June 15	6	Melbourne 4½ p. c. Deb.	110—112	..	4 0 4
560,000	100	Apl. 4	5	Monte Video, Ltd. . .	13—14	..	7 2 11
250,000	100	,,	4½	Newc'tle & Gateshd Con.	228—233	..	3 19 5
541,920	20	May 31	5	Do. 3½ p. c. Deb. .	106—109*	+½	3 4 3
617,946	Stk.	Feb. 24	9½		* Ex div.		
264,855	Stk.	June 29	3½				

Issue.	Share.	When ex-Dividend.	Dividend or Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
150,000	5	May 31	8	Oriental, Ltd. . . .	7½—8	..	5 0 0
135,000	5	,,	8	Do. New, £4 10s. pd.	6⅝—7	..	5 14 3
15,000	5	,,	8	Do. do. 1879, £1 pd.	1½—1⅝	..	4 11 5
60,000	5	Mar. 29	7	Ottoman, Ltd. . . .	5½—6	+⅛	5 16 8
500,000	100	June 1	6	People's Gas of Chicago 2nd Mtg. Bonds	102—106	..	5 13 2
851,070	10	Apl. 27	7	River Plate Ord.. . .	11—11½	..	6 1 9
250,000	Stk.	June 29	4	Do. 4 p. c. Deb. .	101—103*	..	3 17 8
250,000	10	Mar. 29	10	San Paulo, Ltd. . . .	16½—17½	..	5 14 3
135,000	Stk.	Mar. 29	10	Sheffield A.	244—249	+9	4 0 4
209,053	,,	,,	10	Do. B.	244—249	+9	4 0 4
447,427	,,	,,	10	Do. C.	244—249	+9	4 0 4
5,600,000	Stk.	Feb. 10	5½	South Metrop., 4 p.c. Ord.	135—140	..	3 16 2
1,460,000	,,	Jan. 13	3	Do. 3 p. c. Deb. . .	101—103	..	2 18 3
120,000	—	—	6	Tottenham A. 5 p.c. and B. 3½ p.c.	143—145	..	4 2 9
250,520	—	—	4½		103—105	..	4 5 9
55,100	—	—	4	Edmonton 4 p.c. Deb..	115—120	..	3 6 8
182,380	10	June 15	5	Tuscan, Ltd.	9—10	..	5 0 0
149,900	10	Jan. 3	5	Do. 5 p. c. Deb. Red.	99—101	..	4 19 0
				WATER COMPANIES.			
746,184	Stk.	June 29	11	Chelsea, Ord.	315—320*	+2½	3 8 9
150,000	,,	,,	5	Do. 5 p. c. Pref. .	167—170*	+½	2 18 10
160,000	,,	,,	4½	Do. 4½ p. c. Pref. '75	148—153*	+¼	2 18 10
175,785	,,	Mar. 29	4½	Do. 4½ p. c. Deb. .	155—160	..	2 16 3
1,720,560	Stk.	Apl. 13	7	East London, Ord. . .	220—224	..	3 2 6
654,740	,,	June 29	4½	Do. 4½ p. c. Deb. .	155—158*	+½	2 17 0
890,000	,,	,,	8	Do. 3 p. c. Deb. .	101—103*	+½	2 18 3
700,000	50	June 15	7½	Grand Junction 10 p. c. max. .	171—174	..	3 5 9
310,000	Stk.	Mar. 29	4	4 p. c. Deb. .	135—140	..	2 17 2
708,000	Stk.	Feb. 10	14	Kent	360—365	..	3 16 9
160,000	,,	,,	7	Do. New, 7 p. c. max. .	210—215	..	3 5 1
1,043,800	100	June 29	10½	Lambeth, 10 p. c. max. .	298—303*	+½	3 9 4
406,200	100	,,	8	Do. 7½ p. c. max. .	225—230*	−1	3 9 7
350,000	Stk.	Mar. 29	4	Do. 4 p. c. Deb. .	135—140	..	2 17 2
500,000	100	Feb. 11	13½	New River, New Shares	430—435	..	3 3 3
1,000,000	Stk.	Jan. 27	4	Do. 4 p. c. Deb. .	137—142	..	2 16 8
902,300	Stk.	June 15	7½	South-wark and Ord. . . .	193—198	..	3 11 9
126,500	100	,,	7½	7½ p. c. max..	193—198	..	3 15 9
489,200	Stk.	,,	5	5 p. c. Pref.	165—170	..	2 18 10
1,019,585	,,	Apl. 13	4	Vauxhall 4 p. c. A Deb.	135—140	..	2 17 2
1,155,056	Stk.	June 15	10	West Middlesex . . .	300—305	..	3 5 7
200,000	,,	,,	4½	Do. 4½ p. c. Deb. .	154—158	..	2 17 0
200,000	,,	Mar. 10	3	Do. 3 p. c. Deb. .	102—104	..	2 17 8

therefore, I can only conclude that some of the gas-taps on the pipes had been left open from the previous occasion when the gas was turned off at the meter; and as a consequence, when the gas was turned on on Sunday morning these taps were allowing gas to escape. Judging from the effects that it had upon some members of the congregation, necessitating the suspension of the service, I am of opinion that the escape must have arisen from the corona lights in the roof, as no other source would account for the very large quantity of gas that must have been in the atmosphere of the church. Dr. Glasse acted very wisely in suspending the service, as otherwise a serious accident might have happened, as lights were burning in the church at the time. As a matter of fact, the practice of turning off the gas at the meter is one that is open to serious objection, and is not to be recommended. In the first instance, the pipes and fittings within any premises should be perfectly sound and tight: and if such is the case there is nothing whatever gained by turning off the meter-tap, but a danger incurred rather than otherwise, through taps being left on. It is far safer to keep the pipes always charged with gas, and thus avoid the possibility of accidents such as occurred on Sunday last at Greyfriars' Church."

The "Dundee Advertiser" this week publishes a bird's-eye view and description of the new gas-works which are to be erected at Perth, the plans for which have now been adjusted, and the specifications for which are being prepared by Mr. A. Gillespie, of Glasgow. The authorship of the plans is attributed by the paper to Mr. Gillespie; but I observe that one of the Gas Commissioners has written to the Editor that this is a mis-statement, and that the plans are the work of Mr. A. Wilson, the Engineer at Perth. This is the second set of plans which has been prepared. The first—also by Mr. Wilson—was similarly published in the same newspaper on Feb. 1, 1898. The plans were objected to on the ground that they would have cost too much. This cost was put down by some at £70,000—whereas the Commissioners only had borrowing powers to the amount of £50,000—but Bailie Wright, who was then Convener of the Works Committee, made out the sum to be, after deduction of the cost of works which were not gas-works, £43,450. The parties have not agreed as to what the cost would have been; but, at all events, the total outlay would have been more than they could meet, and consequently it was directed that new plans, on a cheaper scale, should be prepared. These have now been finished. They show works which will cost £57,000. In disposition they are quite different from those of February, 1898. In those the retort-house, coal-stores, and purifier-house ran parallel to each other, with their gables to the eastern wall. In the new plans, the retort-house and coal-store run parallel to the south wall, and the purifier-house and lime-sheds run parallel to the east wall; both the erections occupying positions in the middle of the respective sides of the site. The rest of the plant does not vary so much in disposition. The reason for the changing of the positions of the larger buildings is not apparent from the drawings, as the one would appear to be as easily worked as the other. But a great deal depends upon the site itself; and in this connection I recall that at the time of the first publication it was given, as a reason for the placing of the various buildings, that on account of so much of the site being made ground, it had been thought desirable to place the heavier erections on solid earth. This is a matter to be dealt with according to local knowledge; and it doubtless has been so dealt with. Turning to the matter of reducing the capital outlay, if this has been effected to any extent it will probably be found to be partly in greater plainness and less substantiality of building. Apart from this, the apparent saving is effected by the doing away with one coal-shed, a different arrangement in the purifier-house, and the utilization to a greater extent of the western boundary wall as the outer wall of the buildings containing the secondary products plant, workshops, and the like. The dimensions of the retort-house are the same in both plans—194 feet long, 67 feet broad, and with walls 36 feet in height. The capacity is the same—viz., a daily output of 1 million cubic feet of gas (the present output is over 800,000 cubic feet), with room to increase, in the first plan to 1½ million cubic feet, and in the second plan to 2 millions. The first plan showed a coal-store at each side of the retort-house, each of them 194 feet long, 31 feet broad, and with walls 25 feet high. In the new plan, the coal-store is on one side of the retort-house. It is 194 feet long, 49 feet wide, and has walls 32 feet high. Elevators convey the coal from the breaker to storage hoppers on each side of the retort-bench. The system of carbonizing is to be a regenerative one; and the charging and drawing will be by West's Gas Improvement Company's plant—these arrangements being the same in both plans. The greatest change has been effected in the purifier-house. In the first plan, the lime was to be stored in a shed at one end of the house, to be carried by an elevator and conveyor to wherever it should be required, and dropped by means of a shoot into the purifier-boxes. These were, again, to be placed on a steel staging 16 feet from the ground; and the foul lime was to be shot through doors in the bottoms of the boxes, into railway waggons. By the new arrangement, the purifier-boxes are on the ground level; and there is a lime-store at each side of the purifying shed, and no conveying plant. The saving of capital expenditure will consist of the doing away with the steel staging and the elevating and conveying plant; and this saving will thus, in all likelihood, be effected at the cost of revenue. It is therefore a doubtful change. There will require, too, to be two lime-sheds, instead of one; but these are usually light structures, and the cost of an extra shed may not be large. The other arrangements are the same as before. A new station meter, of 80,000 cubic feet capacity, is to be supplied by Messrs. J. Milne and Son, Limited; and a new scrubber is to be furnished by Messrs. W. C. Holmes and Co. Steam is to be raised by means of two Babcock and Wilcox tubular boilers. No new holders are required; there being a gasholder station, containing two holders, in the outskirts of the city, about a mile from the works. There, also, is the governor-house. Neither are new exhausters needed; the present plant being sufficient to deal with the whole of the gas likely to be produced for some years to come. Looked at as a whole, I cannot say that I am impressed with any sense of superiority on the part of the new plans over the old. Of course, the question of reduction or no reduction is complicated by the fact that materials do not cost the same now as they did when the first plans were prepared; and an off-hand opinion, one way or another, is

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SALTLEY WORKS, BIRMINGHAM	2,000,000
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SWINDON (New Swindon Gas Co.)	120,000
SALTLEY WORKS, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
TORONTO (Second Contract; Remodelled)	2,000,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000
YORK	750,000
ROCHESTER	500,000
KINGSTON, ONT.,	300,000
CRYSTAL PALACE DISTRICT	2,000,000
DULUTH, MINN.	300,000
CATERHAM	150,000
LEICESTER	2,000,000
ENSCHEDE	150,000

AND ADDITIONAL WORK.

of no value. But weighing one thing with another, I confess to the view that any saving shown is scarcely sufficient to warrant the delay which has taken place. The Commissioners, however, have to pay the piper, and they have exercised their right to call the tune.

The gas employees of the Aberdeen Corporation have not been long in following the example set in Glasgow, of applying for increased wages. The Gas and Electric Lighting Committee met this week, and considered the matter. They are convinced that in some instances a rise must be given; but they continued the matter for further information.

The Coupar Angus Gas Company have paid a dividend at the rate of 6 per cent., and have reduced the price of gas. The Kelso Gas Company have declared the customary dividend of 10 per cent. The Auchterarden Gas Company have paid a dividend at the rate of 8 per cent., and have voted a bonus of £15 to Mr. J. W. Napier, their Manager. The Langholm Gas Company have paid a dividend at the rate of 7½ per cent.

The Brechin Gas Company have this week accepted offers for 2100 tons of coal, at an average price of 1s. 10½d. per ton over the rate paid last year; but they have still 1100 tons of last year's contract to come in, which reduces the increase to 1s. 3d. per ton. Against this rise has also to be placed an increase of 7d. per ton which the Company are this year to receive for tar.

The Dundee Water Commissioners yesterday adopted their accounts for the past year, and fixed the rates to be levied this year. Treasurer Ritchie, in submitting the accounts, said that the gross estimated expenditure for the current year was £48,820, as against last year's estimate of £49,100, and last year's actual expenditure of £48,933. The estimate for the current year was thus under last year's by £280, and under the actual by £113. The principal cause of this reduction was that, as their valuation this year was lower than it was last year by about £1700, they expected to have less rates to pay to county and parish councils. Turning to the revenue, he said they had in the first place the surplus of £1026 from last year. They made warrantable additions to the assessable rentals of the domestic and public rates, and they also made a moderate allowance for an increase in the special rates. It was proposed to abolish the system adopted last year, by way of experiment, of giving a rebate to consumers by meter of 1 million gallons and upwards, who took more than their consumption for the preceding year. In lieu of it, it was proposed to take 1d. off the meter-rate, reducing it from 7d. to 6d. per 1000 gallons. This would affect every consumer of water by meter within the compulsory area, and not a small number merely, as the rebate system did. In this way, they gave a reduction to all those—numbering close on 500—who used water for trade purposes, of a sum amounting to about £2450, as against £515 given last year to 42 consumers by the rebate arrangement. This involved a diminution of their estimated revenue from water-rates of £879, as compared with last year's estimate; the estimate for the current year being £47,850. Compared with the actual revenue belonging to last year, the reduction was £1334. Rents receivable, less rents and feu-duties payable, were expected to amount to £95. Putting the surplus, the water-rates, and the rents together, the estimated revenue was £48,971. The estimated expenditure being £48,820, there was an apparent surplus of £151. He moved the approval of the estimates, and that for the current year the domestic rate be 10d. per pound, the public rate 1d. per pound, and the rate for consumers by meter, for purposes other than domestic within the area of compulsory supply, 6d. per 1000 gallons. The proposal of the Treasurer was adopted, but only by a small majority; there being a strong desire on the part of some of the members that the reduction should be on the domestic rate, and not on the meter rate.

This is the season of the year when Municipalities indulge in the luxury of water-works inspection. We have had the Glasgow inspection this week, which is the greatest of all, and is said to be the only regular official festival in the year in connection with the Glasgow Corporation. This year's visit was looked forward to with interest, as the Lord Provost—Sir David Richmond—retires in November; and it is the custom to informally nominate the next Lord Provost on the evening of the first day of the inspection. The choice this time was, by a majority, ex-Bailie Chisholm, long known as an active social reformer in the city.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July* 1.

Sulphate of Ammonia.—The month of June has been quiet throughout; and all requirements have been covered without any recovery in values at the close. The quotations are £12 5s. to £12 7s. 6d. per ton, delivered f.o.b. at the ports. The actual business of the month has been exceptionally small; the bulk of the London, Scotch, and larger English makes having been bought in advance, and buyers, being so far supplied, are steadily holding back in regard to further purchasing. Thus only the smaller makes have been available; and those at their minimum output. There is therefore practically no stock to bring forward; and, if demand revives, the position favours a recovery in values. Interest in the forward position is still languid; and "bear" quotations abroad for the later months of the year do not find much response.

Nitrate of Soda is quiet at 7s. 10½d. per cwt. for fine quality on spot

LONDON, *July* 1.

Tar Products.—Quotations in benzols are somewhat of a nominal character as very little fresh business is transpiring; buyers still looking for lower prices, and makers hoping for an advance. Crude naphtha, in sympathy with benzol, is almost unsaleable, and in many cases realizing not more than creosote. A distinct improvement has arisen in the value of solvent naphtha and toluol; business in the former having been done at 1s. 1½d., and enquiries for contracts ahead are freely made. Carbolic acid keeps about the same figure, from 2s. to 2s. 1d. In anthracene there seems little doing, and no appearance of improvement. The impression seems gaining ground that the Continental make is increasing; but the output on this side of the channel should for various well-known reasons be falling off. Pitch is fairly steady, but sales and shipments for prompt delivery are practically at a standstill on account of the weather.

The average quotations for the week are: Tar, 15s. 6d. to 24s. Pitch,

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LONDON,
MARCH, 1899.

east coast, 28s.; west coast, 25s. Benzol, 90's, 6¼d.; 50's, 7¼d. Toluol, 11d. Solvent naphtha, 1s. 1½d. Heavy naphtha, 1s. Crude, 30 per cent. naphtha, 3¼d. Creosote, 3½d. Heavy oils, 62s. 6d. Carbolic acid, 60's, 2s. 1d.; 75's, 2s. 8d. Creosote salts, 47s. 6d. Anthracene, "A," 3½d. to 4d.; "B," 2½d. to 3d.

Sulphate of Ammonia has been steady right throughout the week; and the closing prices are practically the same as the commencing ones—£12 5s. to £12 7s. 6d., less 3½ per cent.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—A strong tone continues to be maintained throughout the coal trade of this district; and notwithstanding the better qualities are only in extremely slow request for house-fire purposes, it is exceptional where pits have had to go on short time, any surplus output being mostly required for stocking purposes. Prices are maintained at the full list rates. The better qualities of round coal are, however, coming in from Yorkshire and other districts at low figures; and merchants, who are strongly resenting the new contract conditions by which prices are to be regulated according to current rates when deliveries are made, are holding back from entering into any engagements with Lancashire coalowners, and are in the meantime purchasing as far as possible from outside districts. It is probable that some definite action will be taken by the merchants and dealers with regard to the new form of contract that has been introduced this season. The gas coal season is now practically over; and only occasional inquiries come upon the market for special quantities. Taking the prices which have represented the general basis on which contracts have been placed, they would seem to average about 8s. 9d. to 9s. per ton at the pit, for ordinary Wigan four-feet gas coals, and 9s. 6d. to 10s. for the better qualities of Arley screened gas coals. Common round coals continue in active demand for steam and forge purposes, and are from about 9s. to 9s. 6d. per ton at the pit. On the better qualities of slack, an advance of 3d. per ton is here and there being quoted; but there is no general upward move, and inferior sorts continue if anything rather plentiful on the market. At the pit, prices are about 6s. 6d. to 7s. per ton for best slack, and 5s. 6d. to 6s. for medium, with common sorts 4s. 9d. to 5s. Shipping is moderate, with steam coals fetching 9s. 6d. to 9s. 9d. at the Garston Docks, 9s. 9d. to 10s. at the High Level, Liverpool, and 10s. 3d. to 10s. 6d. at the Manchester Ship Canal.

Northern Coal Trade.—There is continued activity in the coal trade; but the supplies are now more adequate, and hence there is little alteration in the prices. Best Northumberland steam coals are from 12s. 3d. to 12s. 6d. per ton f.o.b., second-class 11s. 6d., and steam smalls 5s. 6d. In manufacturing coals the demand is steady; and there is a full consumption on old contracts at prices much below those that have ruled in recent weeks. The gas coal trade has been steady. The local consumption is limited; and only moderate quantities have been sent to the gas companies of the South. The price of best Durham gas coals now varies from about 9s. 6d. to 10s. per ton f.o.b.; but sales at the latter price have been few—chiefly one or two cargoes that were early needed, and of special qualities of coal. There is no change in gas coke.

Scotch Coal Trade.—Trade is reported better, which is probably owing to the near approach of the miners' summer holidays. Prices are advancing; the quotations being: Main 8s. 9d. to 9s. per ton f.o.b. Glasgow, ell 9s. 6d. to 10s. 3d., and splint 9s. 9d. to 10s. The shipments for the week amounted to 218,181 tons—an increase of 19,103 tons upon the previous week, but a decrease of 20,505 tons upon the corresponding week of last year. For the year to date, the total shipments have been 3,980,046 tons—a decrease of 421,801 tons upon the same period of last year.

Temporary Failure of the Gloucester Gas Supply.—Some trouble was caused in Gloucester last Thursday by a temporary interruption in the supply of gas. It appears that one of the holders had been emptied for repair, and while being overhauled a large quantity of air found its way in, which, when the vessel was recharged with gas, was forced into the mains. Of course, it was in time exhausted, and the gas was available; but meanwhile the consumers, especially those taking a large quantity of gas for power or cooking purposes, were put to some inconvenience.

Chesterfield Gas Undertaking.—Since the Chesterfield Gas and Water Board took possession of the gas-works in 1896, the demand for gas has increased by 46·69 per cent. To meet this enlarged business, the Board have had to borrow additional money from time to time; and just recently they have asked for the sanction of the Local Government Board to the borrowing of £3959, which will about exhaust their capital powers. Mr. C. H. Luard held an inquiry respecting the application last Friday. The Clerk to the Board (Mr. John Middleton) stated that in 1897 the Board had to borrow £15,000 for the purpose of erecting a new retort-house. The total expenditure under the contract had, however, been £16,172, and £1179 of the sum now proposed to be borrowed would go to pay the balance on that contract. It was now proposed to put down purifiers at an estimated cost of £2500. Referring to the growth in the consumption of gas, he said the amount supplied in May of the present year was 1,220,000 cubic feet in excess of that supplied in May of last year, which in turn was 800,000 cubic feet in excess of that for the same month of the previous year. The total capacity of the holders was 400,000 cubic feet; and on one particular day of last year, there was a maximum demand for 502,000 feet. When the Board took possession, the largest one-day consumption was 330,000 cubic feet. The total consumption during the year ending March, 1896, was 56 million cubic feet, in 1897 66 millions, in 1898 75 millions, and in the year ending March last, it was 83½ millions. This showed an increase in three years of 46·69 per cent. The price charged was 3s. 6d. to private consumers, and less for purposes other than lighting. Within the next two months, the Board would have to decide upon an application to Parliament for an extension of their borrowing powers. At the conclusion of the inquiry, the Inspector visited the works.

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Extension of the Automatic Retort System at the Leeds Gas-Works.—So successful has automatic stoking been at the Meadow Lane and New Wortley gas-works of the Leeds Corporation, that the Committee decided, a short time ago, to introduce the system at the York Street works; and last Tuesday the Sub-Committee who have charge of these works adopted plans for an installation of inclined retorts.

The Yeovil Gas-Works Purchase.—At a meeting of the Yeovil Town Council for the purpose of signing documents for the completion of the purchase of the gas-works, it was stated that the Public Works Loan Commissioners had lent £79,591, the amount of the Umpire's award for the purchase of the works. The Corporation wished to have £93,348; but the Commissioners doubted the power of the Council, under their Act, to borrow certain of the sums applied for. An arrangement had accordingly been made with a local banking company to advance the balance temporarily at 4 per cent. Cheques were signed for the following amounts: The Gas Company, for the undertaking, £79,591; the Company's parliamentary costs, £2123 17s. 6d.; Mr. Howell, Gas Manager, £2075; Mr. W. Marsh, £245; and Mr. J. S. Roberts, £210.

Lodz Gas Company.—The Directors of this Company report that the very favourable results achieved in the year 1897-8, have been surpassed by those for the past twelve months. There was considerable augmentation in the consumption of gas; and the increased production of residuals found a sale mostly at good prices. Consumers took 156,559,700 cubic feet of gas; being an increase of 15,188,700 cubic feet, or 10·7 per cent., on the previous year. A large proportion of the additional consumption was by householders for private lighting purposes—an increase partly attributable to the more general use of the incandescent light, from which still greater results were to be expected. The receipts amounted to 545,133 roubles, against 484,067 roubles for the preceding twelve months; the net profit, inclusive of the balance brought forward, being 237,401 roubles, compared with 208,554 roubles for 1897-8.

Sales of Shares.—At the Royal Hotel, Norwich, Messrs. Spelman recently sold by auction 250 ordinary £10 shares in the City of Norwich Water Company at £19 to £19 9s. each. At a sale by auction last Tuesday, £115 of "A" consolidated stock and £357 of "B" stock in the Sheffield Gas Company was sold at £249 per cent. On the following day, Mr. F. Bond sold three £10 shares in the Ipswich Gas Company at £23 7s. 6d. each; five similar shares realizing £23 10s. apiece. At the same auction, eight £20 shares in the Colchester Gas Company, with dividend from the 1st of January, fetched from £49 to £49 10s. per share. Some £10 "B" shares in the Halstead Gas Company were recently disposed of at £12 10s. per share. Mr. J. S. Reeves sold last Thursday three £20 shares in the Whitstable Gas Company at £42 each. Two similar shares fetched £41 per share, and nine others £40 each. Five £10 shares in the same Company realized £19 each, and nine similar shares £20 apiece. Messrs. Vinten and Sons sold on Monday last week £10 of 5 per cent. preference stock in the Broadstairs Water Company for £15 10s.; £15 of 4 per cent. debenture stock for £18 15s.; and two parcels of £50 of ordinary stock at £63 10s. and £63 15s. respectively. Some shares in the Stirling Gas Company have lately been sold at an average price of £9 6s. each.

The Profits of the Hull Water-Works.—The Finance Committee of the Hull Corporation have resolved to apply the balance of the water-works reserve fund, amounting to £23,840, to meet from time to time extraordinary claims or demands arising against the Corporation in respect of their water-works, or expenses incurred by the Corporation in carrying out any extension. It has also been decided that the unappropriated balance of last year's profits, amounting to £4454, should be carried to the credit of the district fund.

Newbury District Water Company.—The annual meeting of this Company was held last Tuesday, under the presidency of Mr. John Bance. The balance standing to the credit of the profit and loss account amounted to £2621; and the Directors recommended that a dividend of 6 per cent., free of income-tax, on the old shares, to the 31st of March, and the payment of six months' interest from Sept. 28, 1898, to March 31, 1899, at the rate of 6 per cent. per annum, on the new shares. The report was adopted. Mr. John Bance was appointed Managing-Director; and the Board were empowered to raise £2000 on debenture.

The Ramsgate Corporation and the Gas Supply of Minster.—At the meeting of the Ramsgate Corporation last Wednesday, the Gas and Water Engineer (Mr. W. A. Valon) reported that, the necessary pipe connections having been completed, Minster would, for the future, be supplied by gas manufactured at Ramsgate. Gas making at the former place was therefore no longer necessary; and part of the retort-house had been walled off and would be converted into a governor-room and stores, and the retort-house and other apparatus out of use could be cleared away. Notices had been left at every house, informing tenants that, on application, gas could be supplied on the prepayment system in the same way as was done at Ramsgate. Notification had also been given that, as from the 24th of June, the price of gas would be reduced to 3s. 8d. per 1000 cubic feet.

The Suggested Municipalization of the Glastonbury Gas-Works.—In response to a requisition, signed by upwards of a hundred burgesses and others, the Mayor of Glastonbury (Mr. J. Morland) convened a public meeting, which was held last Tuesday, to consider the advisability of purchasing the gas-works. The movement had been promoted by Mr. J. Merrick, a member of the Corporation, who in a long speech advocated the acquisition of the gas undertaking. The Company had been approached on the matter, but they had declined to negotiate; and Mr. Merrick submitted a resolution to the effect that the Town Council should take steps to induce them to come to an amicable arrangement for purchase at a valuation. Several speakers having expressed their views for and against the proposal, Mr. Merrick said he did not wish anyone to receive anything but a fair price, but he would fight tooth and nail against an unjust arbitration. He thought "if they took the bull by the horns, and put their shoulders to the wheel, they would find their way out of the wood." The Mayor said he thought many of them would like to see the gas-works bought, but not at a price which would land them in a difficulty. If the resolution were passed, they must not think the Council were shirking their duty if they proceeded somewhat slowly, because they ought to feel their way. The motion was carried by 46 votes to 3, out of about 120 present.

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Makers of Cripps' Patent Grid Valve and Hydraulic Main Valve.
Makers of Holgate's Patent Gas-Purifying Plant.
Makers of Tysoe's Patent Self-Sealing Mouthpiece.

Newtown (Mon.) Water-Works.—The transfer of these works from the Water Company to the District Council was completed last Saturday week.

The New Water-Works of the Birmingham Corporation at Frankley.—The members of the Birmingham City Council last Friday visited the large reservoir and filter-beds which are being constructed at Frankley, and which are intended to intercept the water as it flows from the Elan Valley works to the city. The reservoir will have a capacity of 200 million gallons; its greatest depth will be 35 feet, and its least 30 feet; and the water area will be about 25 acres. The 18 filter-beds also in course of construction, will have a water area, collectively, of about 14 acres.

The Worksop District Council and the Derwent Water Scheme.—The Derwent Water Bill was the subject of considerable discussion at the meeting of the Worksop District Council on Monday last week. Mr. John Thornton, J.P., the Deputy-Chairman, pointed out that the Nottinghamshire County Council were opposing the Bill in the House of Lords, for the protection of the interests of the county outside Nottingham; and he advocated strengthening the hands of the Council in such opposition by resolutions from the urban and other authorities. The water supply of the county was, he said, dependent upon springs; and they had had experience that the continual mining operations were materially reducing the quantity of water derived from them—in fact, in many cases they had taken it away altogether. He moved—"That the Urban District Council of Worksop, being unanimously of opinion that the water supply of the district is entirely dependent on underground springs, which are already affected by mining operations, begs to urge the County Council to take all such steps as may be necessary to oppose the Derwent Water Bill, which appropriates for the benefit of others the only source of supply that would be available if the underground springs are depleted or fail. The Council is of opinion that, in any appropriation of the water from the Derwent, a reasonable quantity should be held in reserve for the present and future needs of the county." The motion was carried unanimously.

The Directors of the Tonbridge Gas Company have accepted Messrs. J. & H. Robus's schedule of prices for supplying and laying upwards of 10,000 yards of cast-iron gas-mains.

Messrs. T. Piggott and Co., of Birmingham, have obtained a contract amounting to £3946 for the supply of steel troughs and pipes for the Belfast Corporation water scheme.

Messrs. R. Dempster and Sons, Limited, of Elland, have received from the Colwyn Bay and District Gas Company the order for a new set of annular condensers. The work is to be carried out under the supervision of the Gas Company's Engineer, Mr. J. C. Pennington.

At the Mart to-morrow, Mr. Alfred Richards will offer, by order of the Directors, additional stock of the Guildford and Watford Gas Companies; and, by instructions from Executors, some ordinary and preference stock of the Enfield Gas Company and a few shares in the Gas-Meter Company, Limited.

The East Surrey Water Company are inviting tenders for 2000 ordinary "B" shares of £10 each, in lots of ten shares, at a minimum price of £16 per share. The shares are entitled to a dividend not exceeding 7 per cent. per annum, which rate was reached for the year ending at Lady-day last.

In the "JOURNAL" for the 13th ult., an announcement appeared that Messrs. Edwin Fox and Bousfield would sell to-morrow, at the Mart, in one lot, an entire King's share in the New River Company. We learn that the share has been disposed of privately, for £114,000. The income last year was £2895.

Messrs. Richmond and Co., Limited, have just concluded a very successful exhibition at Bridge of Allan, where they made a special feature of a complete "slot" installation, which attracted a great deal of attention. Cookery lectures were delivered by Miss Lillie Richmond to large and appreciative audiences.

Messrs. W. C. Holmes and Co. have just received orders from the Paignton and Stourport Gas Companies for their "New" scrubber-washers of the horizontal form; and from the Dumbarton Corporation for one of their vertical machines—the latter being adopted in order that chambers may be added at a future time without stoppage of the apparatus.

The staffs and employees of the Stratford and Queen Victoria Street branches of Messrs. Richmond and Co., Limited, had their second annual excursion on Saturday, the 24th ult.; the place selected being, as on the previous occasion, Rye House. Dinner was served in the Banqueting Hall—Mr. E. W. T. Richmond, the Managing Director, presiding. After dinner the party indulged in sports on the lawn.

In connection with the installation of inclined retorts now in course of construction at the Nine Elms station of The Gaslight and Coke Company, the tender of West's Gas Improvement Company, Limited, for elevating and conveying machinery, storage hoppers, retort buckstaves, and constructional ironwork has recently been accepted. The same firm have also in hand a contract for coal breaking, elevating, and conveying machinery for the East Greenwich works of the South Metropolitan Gas Company.

In connection with a lifeboat demonstration at Ilkeston on the 24th ult., there was introduced among the trade exhibits a rather novel feature. It consisted of a dray belonging to the Ilkeston Corporation, with gas apparatus, cookers, and lamps in full work. There were two cylinders of compressed gas, kindly lent by Mr. J. Brooks, Gas Engineer to the Midland Railway Company, connected with suitable regulators and apparatus to the cookers and lamps. Two cooks in costume prepared cakes, buns, &c., which were thrown out among the people in various parts of the procession, who were naturally surprised to get them "red hot." The dray was tastefully decorated, and accompanied by several workmen busy at their trades, and by the youngest son of Mr. F. C. Humphrys, the Corporation Gas Engineer (who was responsible for the general arrangement), in costume as a very small lamplighter.

Foolscap 4to, pp. 535, with 239 Illustrations and Steel-Plate Engraving (as Frontispiece) of WILLIAM MURDOCH, *Inventor of Gas Lighting. Morocco Gilt, 21s.; Roan Gilt, 18s.*

THE SIXTH (AND CENTENARY) EDITION OF THE

HANDBOOK

FOR

GAS ENGINEERS and MANAGERS.

By THOMAS NEWBIGGING, M.Inst.C.E.

LONDON: WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
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LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

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ANDREW STEPHENSON,
182, Palmerston Buildings,
Old Broad Street, E.C.
Volcanism, London."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

MELROSE CYCLES

SHOULD be bought by Gas and Water Officials. Ladies' No. 1, £10 10s.; No. 2, £8 10s. Gents' No. 1, £10; No. 2, £8. Highest Quality. Twelve Months' Guaranty. Sent on approval. Catalogue free. MELROSE CYCLE COMPANY, COVENTRY.

SEASON 1899.

BALE'S OXIDE OF IRON, of finest Quality. Summer delivery specially recommended for efficiency and economy.
FIRE CEMENT, PAINT, and CHEMICALS.
120 and 121, NEWGATE STREET, LONDON, E.C.

SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, NEWTON GRANGE, NEWBATTLE, DALKEITH, SCOTLAND.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see p. 74.]

AMMONIACAL LIQUOR wanted.
BROTHERTON AND Co., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

SPENT OXIDE wanted.
BROTHERTON AND Co., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

SPECIAL PAINT FOR GAS-WORKS.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1769.

PATENTS FOR INVENTIONS.
Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

BENZOL, specially made for the Enrichment of Gas.
ELLISON AND MITCHELL, LIMITED, Kilnhurst, near ROTHERHAM.

IRON OXIDE (Bog Ore), best quality, for the Purification of Gas, containing up to 85 per cent. Hydrated Oxide of Iron, and absorbing while being used a high percentage of Blue.
S. BOWLEY AND SON, Wellington Works, Battersea Bridge, LONDON, S.W.

SULPHURIC ACID for Sale.
BROTHERTON AND Co., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PRACTICAL RETORT SETTER.
GEORGE NUTTALL, 32, Havelock Road, Saltley, Birmingham.
Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

SULPHATE OF AMMONIA SATURATORS.
JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

GAS TAR wanted.
BROTHERTON AND Co., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SHEFFIELD CHEMICAL COMPANY, LIMITED.
BUYERS of Spent Oxide. Sellers of OXIDE OF IRON and SULPHURIC ACID.

WANTED, by a Young Man, a Situation on Gas-Works as ASSISTANT. Five Years with well-known Gas Engineers. Understands testing for Illuminating Power and Impurities, and general routine of Gas-Works.
Address No. 3297, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GOOD, steady Stoker Wanted. Wages 25s. per week.
Apply to the MANAGER, Gas-Works, Sandown, ISLE OF WIGHT.

WANTED, a Gas-Fitter.
For Particulars apply to the MANAGER, Gas-Works, HALESOWEN.

WORKING Foreman Wanted.
Apply, stating Age, Experience, and Wages required, to the MANAGER, Gas-Works, HINCKLEY.

WANTED, a thoroughly experienced Man to look after Engines, Exhausters, and Pressure Registers.
Apply by letter, stating Age, Experience, and Wages required, with References, to No. 3295, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Stoker for small Country Works, using five Retorts in Winter and two Retorts in Summer. Constant Situation to one willing to make himself generally useful about the Works. Wages 21s. per week. No night work.
References (by letter) to No. 3298, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS MANAGERS.
WANTED, one or two Gentlemen to join Advertiser in BRINGING OUT a NOVEL AND USEFUL PATENT. Gentlemen having a thorough knowledge of Distribution preferred.
Address No. 3300, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-WORKS FOREMAN.
WANTED, for a Gas-Works in Scotland, manufacturing over 100 millions per annum, a WORKS FOREMAN. Applicants must be good Mechanics, have a thorough knowledge of Regenerative Furnaces, and accustomed to control Men. Wages from 40s. weekly, according to experience.
Apply, immediately, by letter, enclosing three recent Testimonials, to No. 3299, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

MERTHYR TYDFIL GAS COMPANY.
WANTED, a competent Young Man as INSPECTOR of METERS and ASSISTANT-CLERK in the Gas-Fittings Department. Wages, 25s. per week.
Applications, in own writing, stating Age, where last employed, and enclosing *copies* only of Three recent Testimonials as to Character and Experience, to be addressed to the undersigned not later than Tuesday, the 11th of July inst.
JOHN L. COCKER,
Secretary and General Manager.
Gas Office and Works, Merthyr Tydfil,
Glamorganshire, July 1, 1899.

SHEFFIELD UNITED GASLIGHT COMPANY.
GAS ENGINEER.
THE Directors of the above Company require the services of an experienced practical ENGINEER.
Applicants must have a thorough knowledge of the Manufacture, Purification, and Distribution of Gas; have had experience of Stoking Machinery and Regenerative Firing; be able to prepare Plans and construct New Works; also understand the Making of Sulphuric Acid and Sulphate of Ammonia, and the erection of Plant in connection therewith.
The successful Candidate will be required to devote the whole of his time to the duties of the Office.
Applications, marked "Engineer," stating Qualifications, Age, if Married, and Salary required, to be delivered not later than Thursday, July 6, addressed to Sir Fredk. T. Mappin, Bart., M.P., the Chairman of the Company.
Testimonials not to be sent in the first instance, nor till asked for.
By order,
HANBURY THOMAS,
General Manager and Secretary.
Gas Company's Offices, Commercial Street,
Sheffield, June 13, 1899.

WANTED, Gas Liquor.
CARDIFF ALKALI COMPANY, LIMITED, CARDIFF.

FIELD'S ANALYSIS.
SECOND-HAND Copies of the above-named "Analysis" for the Years 1869 to 1881, 1886, 1889, 1891, 1893, 1894, and 1895, FOR SALE. Price for the set, £4 4s.; or offers may be made for single copies.
Apply to No. 3292, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE, cheap to clear—
TOWER SCRUBBER, Walker's, 5 ft. by 40 ft.
STATION METER, 8-inch, complete and perfect.
EXHAUSTER and ENGINE, combined, Waller's, 9-inch Valves, Governors, &c., complete.
GASHOLDER, 35 ft. by 14 ft. deep. Only six years old.
If sold this month will accept any reasonable offer.
J. FIRTH BLAKELEY & Co., Thornhill, DEWSBURY.

FOR SALE, in good Condition (replaced by larger)—A STATION METER, with 6-inch Connections, all complete, only just out of use.
Address MANAGER, Gas-Works, Wokingham, BERKS.

FOR SALE—A Single-Lift Gasholder, 9600 cubic feet capacity, 32 feet diameter, 13 feet deep, strong Guide-Frame, of modern construction and excellent condition. About to be removed for extension of Works.
Can be seen in work on application to the SECRETARY, Earls Colne Gas Company, ESSEX; or to the Manufacturers, S. CUTLER AND SONS, Millwall, LONDON.

FOR SALE, cheap—
Two PURIFIERS, 8 ft. square by 4 ft. deep.
Two " 5 ft. " 4 ft. "
One " 5 ft. " 3 ft. "
One EXHAUSTER, 20,000 Cubic Feet per hour.
Two " 5000 " " "
Also CONDENSERS, SCRUBBERS, WASHERS GASHOLDERS and TANKS, VALVES, &c., &c.
Apply to SAML. WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

FOR SALE—One Station Meter, by J. & J. Braddock, complete with 6-inch Valves and Bye-Pass, quite equal to new.
One GOVERNOR, with 7-inch Inlet and Outlet Pipes, and Bye-Pass. Also by Braddock.
One Patent CENTRE-VALVE, with 6-inch Connections, by C. & W. Walker.
20 Cast-Iron RETORT MOUTHPIECES, oval, 21 in. by 15 in., fitted with Lids, Screws, and Cross-Bars.
A quantity of 6-inch and 8-inch VALVES.
Apply to H. I. WILLIAMS & Co., Kidsgrove, STAFFORDSHIRE.

THE Directors of the Cork Gas Consumers' Company are prepared to receive TENDERS for the supply of up to 10,000 Tons of GAS COAL (half of which may be delivered by November, and balance by end of March ensuing).
By order,
J. S. O'MAHONY,
Secretary.
Gas Offices, Cork.

TENDERS FOR TAR.
THE Directors of the Clayton, Allerton, and Thornton Gas Company are prepared to receive TENDERS for the purchase of the COAL TAR produced at these Works during a period of Twelve Months from the 1st day of July, 1899, to the 30th of June, 1900.
Quantity, about 400 Tons.
The Tar will have to be removed daily from the 1st of October to the end of April.
Sealed Tenders, endorsed "Tender for Tar," addressed to the Chairman at the Gas-Works, and to be delivered at or before Noon, on Monday, the 10th day of July, 1899.
The Directors do not pledge themselves to accept the highest or any Tender.
By order,
JOHN NIVEN,
Secretary and Manager.
Gas-Works, Clayton, near Bradford,
June 13, 1899.

TO SULPHURIC ACID MAKERS.
THE Directors of the Clayton, Allerton, and Thornton Gas Company are prepared to receive TENDERS for the supply from the 1st of July, 1899, to the 30th of June, 1900, or for a longer period, of 60 to 80 Tons per year (more or less) of SULPHURIC ACID for Sulphate of Ammonia Making. Made from Brimstone or Spent Oxide (not from Pyrites), and to Twaddel 146 to 148 at 60° Fahr.
The said Acid to be delivered into Storage Tank at the Company's Works.
Sealed Tenders, endorsed "Tender for Acid," to be addressed to the Chairman at the Gas-Works, and to be delivered at or before Noon, on Monday, the 10th day of July, 1899.
The Directors do not pledge themselves to accept the lowest or any Tender.
By order,
JOHN NIVEN,
Secretary and Manager.
Gas-Works, Clayton, near Bradford,
June 13, 1899.

CARDIFF GASLIGHT AND COKE COMPANY.
TENDERS FOR COALS.
THE Directors of the above Company are prepared to receive TENDERS for a supply of 79,000 Tons of Best Well-Screened large GAS COALS, to be delivered between August, 1899, and the 30th of June, 1900, in monthly quantities in accordance with the Specification.
Parties tendering may do so for the whole quantity, or for quantities of from 5000 Tons upwards.
Forms of Tender and Specification of monthly deliveries may be obtained on application to the Engineer and Manager, Mr. H. Morley, M.Inst.C.E.
Sealed Tenders to be sent to the undersigned not later than Ten a.m. Thursday, the 6th day of July next, addressed to the Chairman of the Company, endorsed "Tender for Coal."
The Directors do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to apportion the whole quantity as they may think fit.
By order,
GEORGE CLARRY,
Secretary.
Gas Offices, Cardiff,
May 31, 1899.

TO GASHOLDER MAKERS.

THE Corporation of Halifax are prepared to receive TENDERS for the supply and erection of a RELIEF HOLDER in connection with their Carburetted Water-Gas Plant.

Form of Tender, copy of Specification, and Drawing may be obtained on application to Mr. Thos. Holgate, Gas Engineer, Halifax.

Tenders, endorsed "Relief Gasholder," to be delivered to the Town Clerk, Town Hall, Halifax, not later than Ten a.m., on Wednesday, the 12th of July, 1899.

The Contractor will be required to observe the Fair Contracts Clauses of the Halifax Corporation.

The Corporation are not pledged to accept the lowest or any Tender.

By order,
KEIGHLEY WALTON,
Town Clerk.

Town Hall, Halifax,
June 29, 1899.

CITY OF BRADFORD.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas and Electricity Supply Committee of the Bradford Corporation are prepared to receive TENDERS for the supply of best GAS COAL, COBBLES, NUTS, and CANNEL, all to be Well-Screened, Dressed, and free from Shale and Pyrites, to be delivered at the several Works of the Corporation in the City during the period of One Year or of Two Years, commencing on the 1st day of August next, as may be agreed upon.

Form of Tender, with any further Information required, may be had on application to Mr. Wood, Gas Engineer, Town Hall.

Sealed Tenders, endorsed "Tender for Coal," to be sent to me on or before Wednesday, the 19th of July next.

Persons tendering must give an assurance that they have paid to their Workmen for the three months preceding date of Tender not less than the minimum Standard Rate of Wages, and undertake to continue to pay during the Contract the same Rate of Wages.

The lowest or any Tender will not necessarily be accepted.

FREDERICK STEVENS,
Acting Town Clerk.

Town Hall, Bradford,
June 22, 1899.

URBAN DISTRICT COUNCIL BOROUGH OF NEWRY

TENDERS FOR COAL.

THE Gas Committee of the above Council invite TENDERS for the supply of from 3000 to 3500 Tons of best GAS COAL (Screened) for a period of Twelve Months, to be delivered at such times, and in such quantities, as may be required by the Committee, and to weigh 20 cwt. to the ton over the Gas Committee's Weighing-Machine at their Works (said Machine regularly inspected by Officer under Weights and Measures Act), and delivered *free ex* Ship or Steamer at Albert Basin, Newry.

The Coal to be fresh Wrought, Dry, and free from Clench, Pyrites, or other Objectionable Matter for Gas Making.

Further Particulars may be obtained from Mr. A. Gibb, Manager.

Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of the Coal, and where raised, to be addressed to John Treanor, Esq., Chairman, and delivered to the undersigned not later than Eleven a.m., on Friday, the 14th of July next.

The Committee reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender.

By order,
R. H. DOHERTY,
Town Clerk.

New Town Hall, Newry,
June 30, 1899.

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)

GENERAL STORES.

THE Gas Committee invite Tenders for the supply of the following MATERIALS, in such quantities as may be required during the Twelve Months ending Aug. 31, 1900:—

1. Wrought-Iron and Steel.
2. Lead Pipe, Block Tin, Tubing, Pendants, &c.
3. Bolts, Nuts, Rivets, &c.
4. Iron Castings, Cast-Iron Pipes, &c.
5. Gun-Metal Meter Taps and Keys, and Brass Lamp Tops.
6. Wrought-Iron Steam and Gas Tubing and Sundry Fittings.
7. Gas-Meters.
8. Paints, White and Red Lead, &c.
9. Chandlery.
10. Oil and Tallow.
11. Cotton Waste.
12. Timber.
13. Ropes, Yarn, and Twine.
14. Steel Shovels, Galvanized Iron Scoops, and Buckets.
15. Brushes.
16. Testing and Repairing of Weighing-Machines.
17. Gun-Metal Fittings for Meters.
18. India-Rubber Rings, Tubing, Sheeting, &c.

Forms of Tender and all Information may be obtained, and samples seen, on application to the Gas Engineer, Gas Offices, Bloom Street, Salford.

Sealed Tenders, endorsed "Tenders for Stores," addressed to the Chairman of the Gas Committee, Town Hall, Salford, to be delivered to me not later than Three p.m., on Thursday, July 13, 1899.

L. C. EVANS,
Town Clerk (*pro tem.*).

Town Hall, Salford,
June 27 1899.

THE Derby District Residual Products Committee are prepared to receive TENDERS for about 800 Tons of TAR and 1150 Tons of AMMONIACAL LIQUOR.

For further Particulars and Forms of Tender, apply to
JOHN ANDREWS,
Hon. Sec.

Gas-Works, Langley Mill.

TENDERS FOR GAS COAL.

THE Directors of the Ramsey Gas Company (Huntingdonshire) invite TENDERS for the supply of 500 Tons of best screened GAS COAL, to be delivered during the ensuing Year, commencing in August next, in quantities monthly as may be required.

Tenders, stating Price per Ton, delivered free at Ramsey, G.N. Station, to be sent to me on or before the 15th inst.

No Special Forms issued.

The Directors do not bind themselves to accept the lowest or any Tender.

WILLIAM ORRISS,
Secretary.

Ramsey, July 1, 1899.

DARWEN CORPORATION.
(GAS DEPARTMENT.)

THE Corporation are prepared to receive TENDERS for the supply of COAL for One, Two, or Three Years, to be delivered at the Gas-Works Siding in the Corporation Waggons.

Forms of Tender and all Information as to quantities may be obtained on application to Mr. A. H. Smith, Gas Engineer, Darwen.

Sealed Tenders, endorsed "Coal," must be delivered to the undersigned at or before noon on Monday, the 24th day of July, 1899.

No Tender necessarily accepted.

By order,
CHAS. COSTEKER,
Town Clerk.

Town Clerk's Offices,
Darwen, June 30, 1899.

GLASGOW CORPORATION.
(GAS DEPARTMENT.)

TENDERS FOR METERS.

THE Corporation of Glasgow invite TENDERS for the supply of such METERS as may be required by them for Twelve Months from the 1st prox.

Forms of Tender may be obtained on application to Mr. Foulis, the Manager, at the Gas Office, 45, John Street, Glasgow; and sealed offers, marked "Tender for Gas-Meters," addressed to the Subscriber, will be received by him on or before Tuesday, the 11th prox.

The Corporation do not bind themselves to accept the lowest or any Offer.

J. P. MARWICK,
Town Clerk.

City Chambers, Glasgow,
June 29, 1899.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the supply of LIME, TUBES and FITTINGS, and SULPHURIC ACID, and also for the purchase of surplus TAR.

Specification and Form of Tender may be obtained from Mr. W. Whatmough, Gas Manager.

Contractors tendering for this work must pay their Workpeople at least the Standard or Trade Union Rate of Wages, and observe the Trade Conditions which attach to the various kinds of work for which the Tender is sent in.

Sealed and endorsed Tenders to be sent to me not later than Tuesday, July 18, 1899.

By order,
J. H. BALDWICK,
Town Clerk.

Municipal Buildings, Heywood,
June 21, 1899.

CORPORATION OF LANCASTER.
(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee are prepared to receive TENDERS for the supply of screened GAS COAL and CANNEL delivered on the Gas-Works Siding, Lancaster, in such quantities and at such times as may be required during a period of One Year, commencing delivery Sept. 1 next.

Sealed Tenders, endorsed "Gas Coal," giving full Particulars of the Coal and Cannel offered, must be delivered to T. Conn Hughes, Esq., Town Clerk, Lancaster, on or before July 15 next.

Any further Information and Forms of Tender may be obtained on application to the undersigned.

C. ARMITAGE.

Gas-Works, Lancaster,
June 29, 1899.

BOROUGH OF CHORLEY.

TO COLLIERY OWNERS AND OTHERS.

THE Chorley Corporation invite Tenders for the supply of GAS COAL and NUTS, CANNEL, and OIL required at their Gas-Works during a period of Twelve Months, commencing the 1st of September next.

Forms of Tender for Coal and Cannel, and any further Information may be obtained on application to Mr. John M'Cubbin, Gas Manager, Chorley.

Tenders, endorsed "Coal," "Cannel," or "Oil," as the case may be, to be sent to me before Four o'clock p.m., on Wednesday, the 12th of July next.

The Corporation do not bind themselves to accept any Tender.

By order,
JNO. MILLS,
Town Clerk.

Town Hall, Chorley,
June 30, 1899.

TENDERS FOR COALS.

THE Directors of the Malton Gas Company invite TENDERS for the supply of about 4500 Tons of doubled screened GAS NUTS, during the Year ending June 30, 1900.

Particulars and Forms of Tender may be obtained on application to

HENRY TOBEY,
Secretary.

Gas-Works, Malton, Yorks.

WORTHING GASLIGHT AND COKE COMPANY.

THE Company are prepared to receive TENDERS for 300 ORDINARY SHARES of £10 each, ranking for a Standard Dividend of 7 per cent. per annum, subject to the Sliding-Scale.

Minimum Price, £16 per Share.

Tenders must be sent in not later than Eleven a.m., Friday, the 28th of July, 1899.

Particulars, Conditions, and Form of Tender obtainable on application to W. F. VERRALL, Secretary to the Company, 55, Chapel Road, WORTHING.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

GUILDFORD GASLIGHT AND COKE COMPANY.

£5000 OF ORDINARY STOCK,

Ranking for a Standard Dividend of 5 per cent. per annum subject to the Sliding Scale; the Dividend on similar Stock in the Company having for several years past been at this rate, and paid free of Income-Tax.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION at the Mart, E.C., on Wednesday, July 5, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

WATFORD GAS AND COKE COMPANY.

£8500 "C" CAPITAL STOCK,

Ranking for a Standard Dividend of 7 per cent. subject to the Sliding Scale, the last Dividend on the Company's "C" Capital Stock having been at the rate of 9 per cent. per annum.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at he Mart, E.C., on Wednesday, July 5, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

"GAS, AND HOW TO USE IT."

A useful little Brochure, suitable for Distribution among Gas Consumers in the District of any Gas Company, and containing

USEFUL HINTS TO GAS CONSUMERS, A COMPARISON OF INCANDESCENT BURNERS WITH ELECTRIC LIGHT, &c.

BY

J. H. TROUGHTON.

Sample Copies 6d. *each.*

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The Pamphlet can be specialized to suit the Price of Gas and other Conditions of supply in any particular District, at a slightly increased Charge.

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Crown 4to., Price 3s. 6d.

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(Of One Million Cubic Feet Capacity)
AT THE
SUTTON GAS-WORKS.
Designed and carried out by
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MEMBER OF THE SOCIETY OF ARTS,
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HOLMSIDE
GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . .	11,205 Cubic Feet.
Illuminating Power	16$\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality)	13¾ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR
PELTON GAS COALS.

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Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

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HOLMSIDE & SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

NOTICE.

THE Acetylene Illuminating Company, Limited, having published and issued an advertisement or circular claiming that they hold the British Patents for the Manufacture of Calcium Carbide by means of the Electric Furnace, we guarantee to indemnify anyone who buys Carbide from us against any claim by "The Acetylene Illuminating Company, Limited," or anyone else.

THE READ-HOLLIDAY ACETYLENE COMPANY, LIMITED, Acetylene Gas Engineers and Carbide of Calcium Manufacturers, HUDDERSFIELD.

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OUT OF THEIR
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Analysis made by
Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

For Price, &c., apply to the
WEARDALE IRON & COAL Co., Ld.
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ENRICH YOUR GAS
WITH CHEAP
BENZOL,
SPECIALLY PREPARED, FREE FROM SULPHUR.

AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

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BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per Ton. .	10,500 Cubic Feet.
Illuminating Power . .	16·9 Candles.
Coke	66·7 Coke.
Sulphur	0·86 Sulphur.
Ash	2·04 Ash.

For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
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MARQUIS OF LONDONDERRY'S COLLIERIES,
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Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by
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Manufacture & supply best quality of
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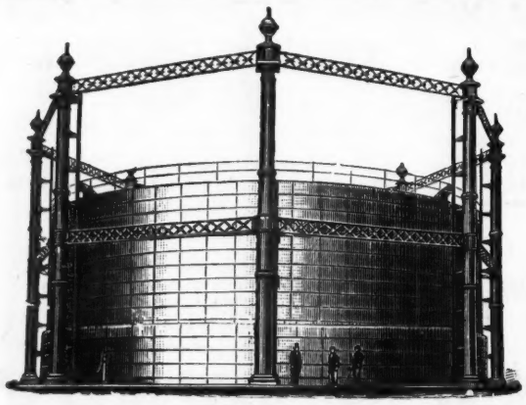

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References to 600 Works already erected.

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Specially adapted for Siemens-Martin Gas-Furnaces; also for Gas, Copper, Iron, Steel, and other Furnaces where intense heat is required.

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CAUTION! CAUTION! CAUTION!

THE WARNING of THE WELSBACH INCANDESCENT GAS-LIGHT COMPANY, LIMITED, against Buying, Selling, or Using—

DAYLIGHT COMPANY'S MANTLES,

SUNLIGHT COMPANY'S WHITE MANTLES,

has been proved to be justified so far as the Daylight Mantle is concerned, by the recent

JUDGMENT

of Mr. JUSTICE BYRNE, whereby the

DAYLIGHT COMPANY'S MANTLE

is pronounced an

INFRINGEMENT OF THE COMPANY'S PATENTS.

Having disposed of the Daylight Company, the Welsbach Incandescent Gas-Light Company will, notwithstanding all assertions to the contrary, now push on with the ACTION AGAINST the **NEW SUNLIGHT INCANDESCENT COMPANY, LIMITED,** and they are advised that a similar Judgment will be obtained against that Company.

ALL DEALERS and the **PUBLIC** are **CAUTIONED** against **BUYING, SELLING,** or **USING**

SUNLIGHT COMPANY'S WHITE MANTLES,

DAYLIGHT COMPANY'S MANTLES,

as well as similar Mantles imported from the Continent and hawked about the Country.

☞ **USERS are EQUALLY LIABLE with DEALERS.**

The Welsbach Incandescent Gas-Light Co., Ltd.,

Palmer Street and York Street, WESTMINSTER,

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G. & J. HAIGH,

Raven's Lodge Fire-Brick Works, DEWSBURY.

Manufacturers of MACHINE-MADE RETORTS and

FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character suitable for **GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.**

For Prices and Analysis, apply as above.

JOHN BROWN & CO., LTD., SHEFFIELD,

Proprietors of

ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

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Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·80.

VERY FREE FROM IMPURITIES.

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HISLOP'S PATENT REGENERATIVE RETORT-SETTINGS

These Settings are Testified to and guaranteed to produce **more Gas per day,** to be more **simple** in **Management,** to have **greater Durability,** to be **more Economical** in **Labour** and **Fuel,** and to have the **Lowest Cost for Renewals** of any system in the Market. Gas Engineers and Managers would do well to give these advantages their careful consideration, when contemplating extension of their Retort-Benches, or when filling existing Ovens.

Further Particulars from the Principal Agent, or from C. M. HAMILTON, Retort Builder, Hamilton, Agent for Scotland & Ireland.

NOTE: **The Agency held by Messrs. Drake & Son, Halifax, for England, Wales, and Abroad has now ceased; and they have no authority whatever to represent the Patentee, although persistently advertising themselves as Agents.**

All Enquiries to be addressed to R. F. HISLOP, Gas Engineer, CRAIGIELEA, PAISLEY.

H. KIRKHAM'S PATENT "IMPERIAL" WASHER-SCRUBBER.

TESTIMONIAL

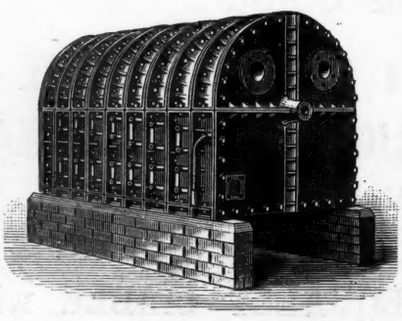
The Dover Gaslight Company,
Gas-Works, Buckland,
Dover, Feb. 8, 1899.

H. KIRKHAM, Esq.

Dear Sir,—Have now made further tests with the Washer fitted with your PATENT WASHING DEVICES, and have much pleasure in reporting that *the results were highly satisfactory*; also, I ascertained that the maximum results were obtained when the machine was working at three revolutions per minute. At this speed 13 to 14 gallons of water per ton of coal carbonized were converted into 10-oz. Ammoniacal Liquor, and at same time the Gas was free from Ammonia.

Should you wish further details, I will forward them.

I am, dear Sir, yours truly,
RAPHAEL HERRING, Engineer.



EFFICIENCY GUARANTEED.

Estimates given for a complete set of Segments for one wheel, or for refitting the whole number of wheels in a machine, also for Washer-Scrubbers complete.

The Scrubbing Devices are metal scrolls fixed in cages of segmental form, which can be readily and successively removed from the wheels through a manhole on the top or side of the machine, and the enclosed Scrubbing Devices taken out, cleaned, and replaced without the delay that necessarily takes place when the entire scrubbing material of the whole wheel has to be dealt with in one operation—thus effecting an important saving in time and labour. These Cages can be applied to the wheels of any machines of the type shown, and will increase their efficiency above 20 per cent.

The Scrubbing Devices are unequalled for extracting the whole of the Ammonia and a very large proportion of the Carbonic Acid and Sulphuretted Hydrogen from the Gas; and, if required, the strength of the Ammoniacal Liquor can be worked up to 30 oz. and above, which greatly reduces the quantity of Oxide or Lime, and also the amount of Labour for Purification.

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Gas and General Engineers,

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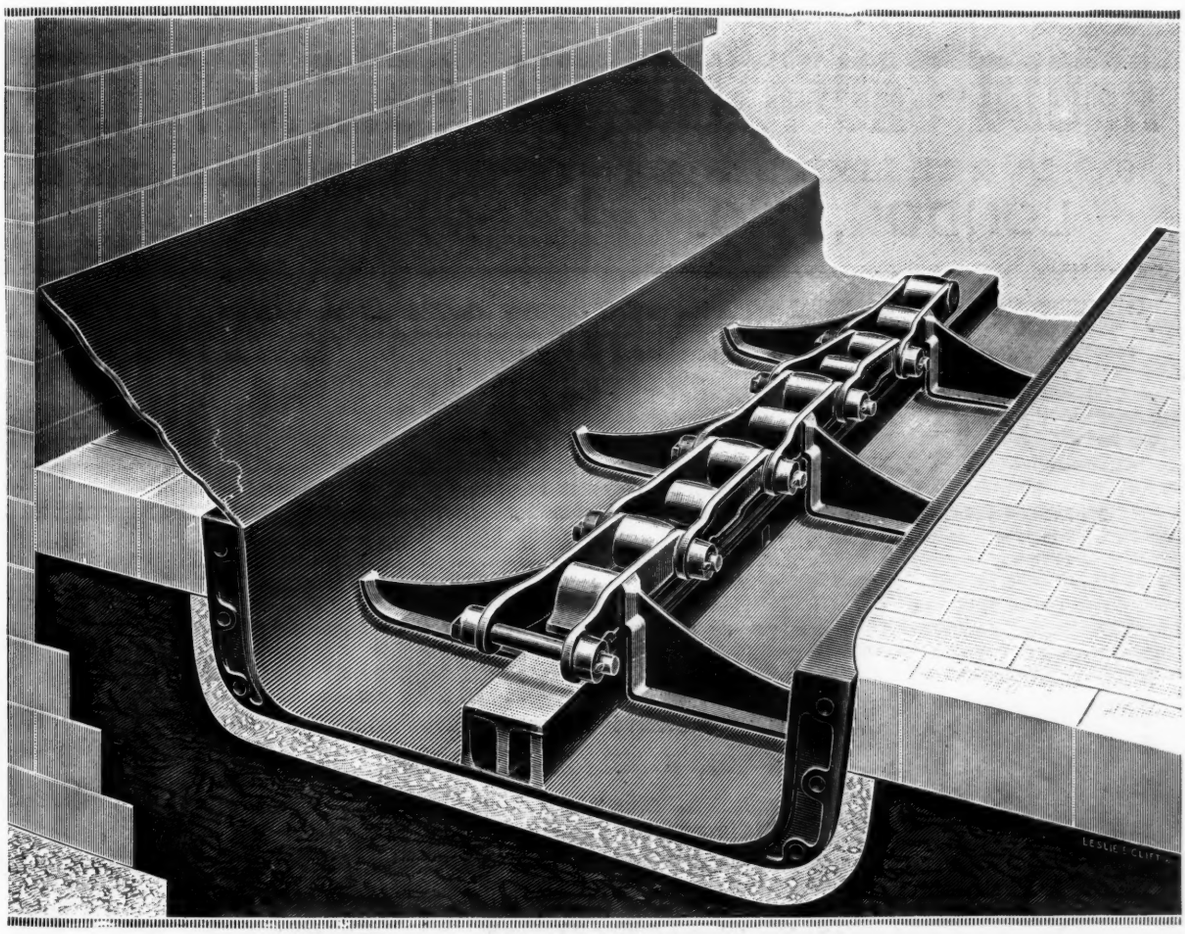
SOLE MANUFACTURERS OF

West's Patent Silent COKE-CONVEYOR

For Conveying, Elevating, Storing, and Stacking

HOT COKE from GAS-RETORTS and COKE-OVENS.

These Conveyors are fitted with Hunt's Patent Anti-Friction Roller Chain, which is especially adapted for this purpose.



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Simplicity in Design, and does not damage the Coke.
Silent in action.
The Roller Chain ensures long life to the Chains and Chain Wheels.

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OIL FOR GAS MAKING

PURE DISTILLATE.

HOMOGENEOUS IN CHARACTER.

NO MIXTURE.

CAN BE STORED SAFELY ANYWHERE.

FLASH POINT GUARANTEED OVER 200° FAHR.

(ABEL'S CLOSED TEST.)

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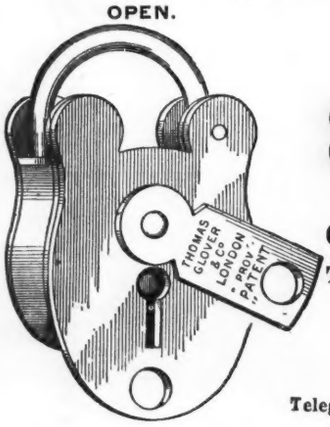

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PREVENTS TAMPERING WITH THE

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The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.

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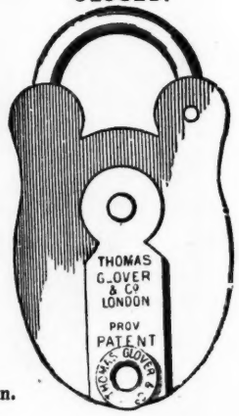

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BRISTOL: 28, BATH STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 1008.

BIRMINGHAM: 1, OOZELLS STREET. *Telegraphic Address:* "GOTHIC."

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 3098.

GLASGOW: ARGYLE WORKS, KINNING PARK. *Telegraphic Address:* "GASMAIN." Telephone No. 1525 South Side.

THE SUNLIGHT INCANDESCENT GAS-BURNER

Applications for **AGENCIES** now being received.

NOTE THESE FEATURES:

A1. WHITE MANTLES.
Longest Lived and Highest Candle Power.

'SUNLIGHT' TINTED MANTLES.
Strongest and Pleasantest Colour.

These are **INTERCHANGEABLE** on same Burner.

BURNERS WITH CHIMNEYS.
Cheapest in the Market.

CHIMNEYLESS BURNERS.
Cheapest, Simplest, and Most Efficient.

SELF-LIGHTER.
Only Efficient System.

A great sensation with this unique combination of features is promised to our Agents for the coming season. Any firm of standing, applying early enough, will be very favourably dealt with.

An early visit to the London Show-Rooms is especially solicited.

SPECIAL NOTICE.

Sunlight Tinted Mantles have been declared by the Courts to be "as far asunder as the Poles" from the Welsbach System, and our Customers can rely on it that

SUNLIGHT WHITE MANTLES

also are NO Infringement of that or any other Patent, but are made under a Series of Independent Patents, and by an entirely New Process. This we definitely guarantee.

We give with every Mantle sold an absolute indemnity to both seller and user against all molestation on this account.

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THE WORKING PARTS OF A TIN-CASE DRY METER ENCLOSED IN A TWO-PART IRON-CASE.

THIS Meter combines all the advantages of the Dry Gas-Meter with the strength and durability of the Wet Meter. It consists of Cast-Iron Cases front and back enclosing the bellows, and screwed to each other with the Division-Plate between; while the upper portion containing the Valve Chambers and Index is made of extra thick Tinned Iron—the Side Tubes being made of Brass, with suitable provision for Trapping any Condensation.

It is well known that the only parts of an ordinary Tin-Case Dry Meter which are attacked by outside Corrosion are the bottom and the lower parts of the sides, and also the side tubes. In this Composite Meter, these parts are made either of Cast-Iron or Brass; and thus rapid deterioration is prevented, and the weight is not unduly increased.

JAMES MILNE & SON, LTD.,

GAS ENGINEERS, Milton House Works, EDINBURGH,

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Telegrams: "Robustness, London."

RETORT-HOUSE, SETTINGS, & RAILWAY

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IN COURSE OF ERECTION BY OUR OWN WORKMEN.

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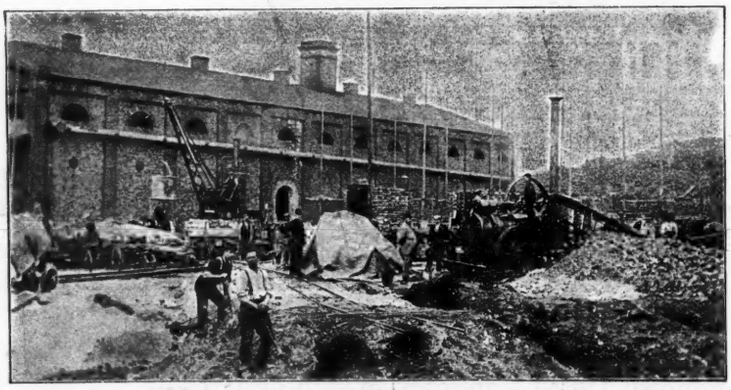
Special Facilities for RECONSTRUCTING GAS-WORKS.

CONDENSERS, SCRUBBERS, WASHERS, EXHAUSTERS, TANKS, and every REQUISITE.



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INCLINED and FLOOR-LEVEL SETTINGS with or without REGENERATIVE or GENERATOR FURNACES, with or without IRONWORK. COMPLETE RE-SETTING.

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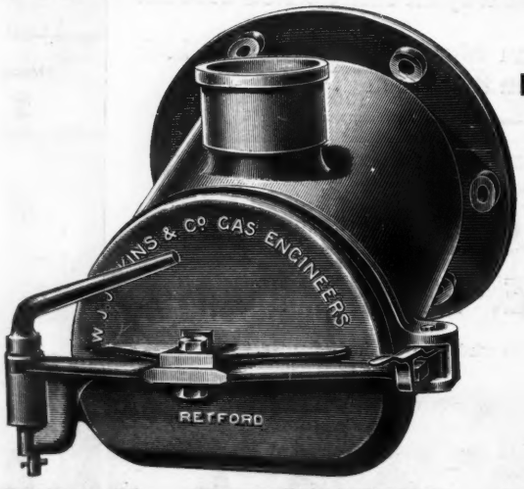
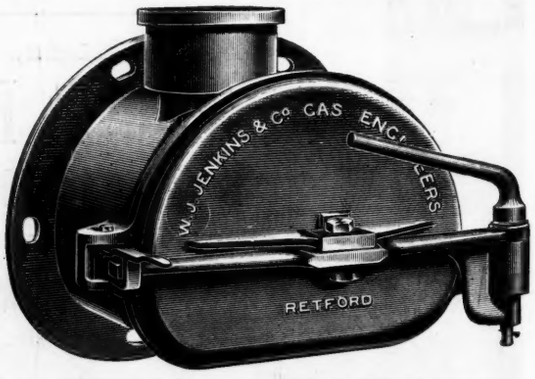
WITH SELF-SEALING LIDS FOR HORIZONTAL AND INCLINED RETORTS.





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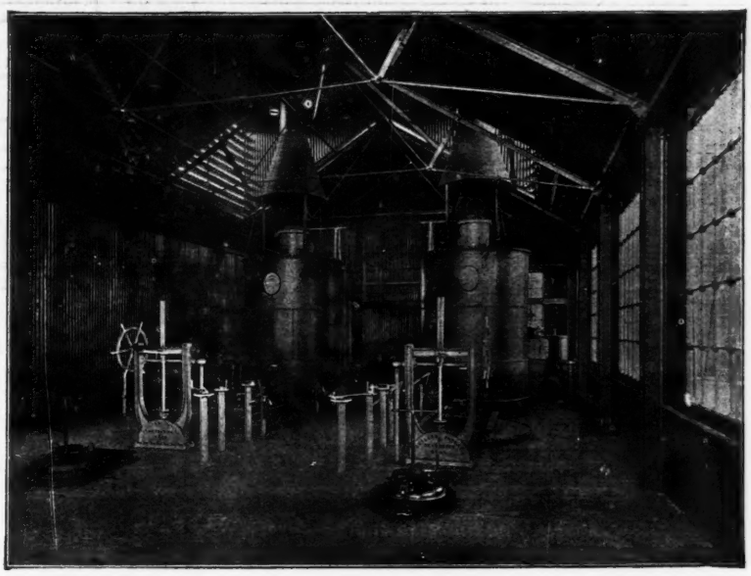
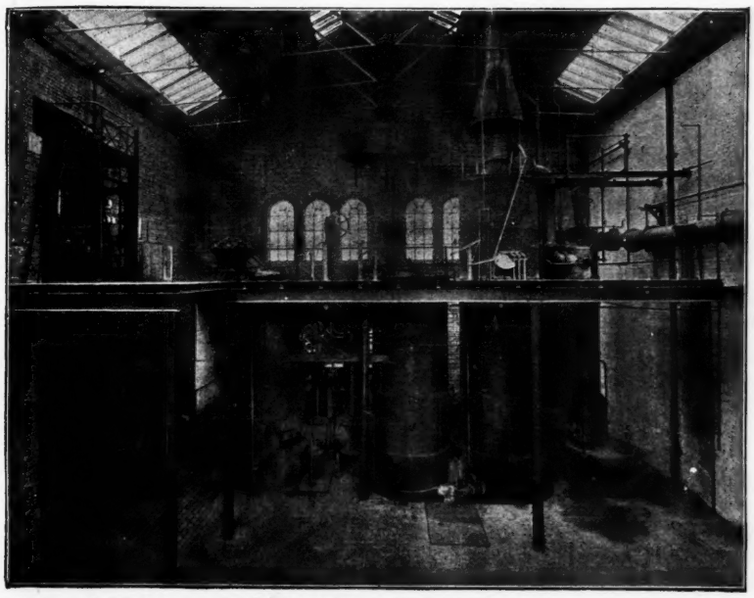
GASHOLDERS.

CARBURETTED WATER-GAS PLANT.



Water-Gas Plant at Southall.



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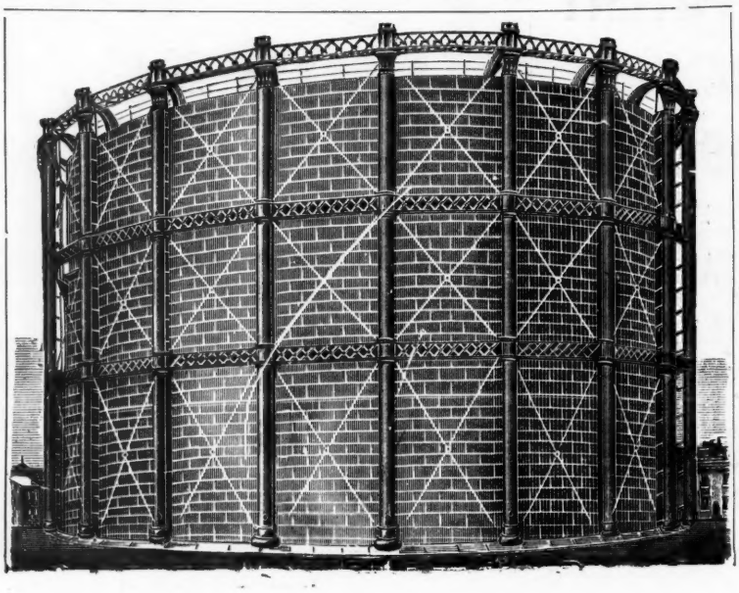

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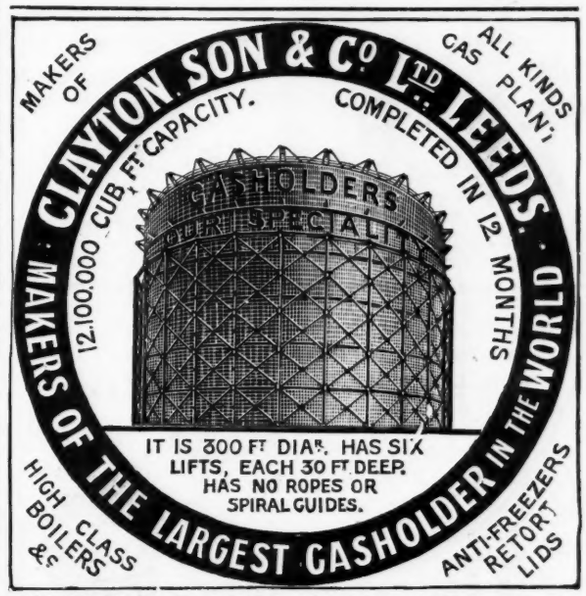
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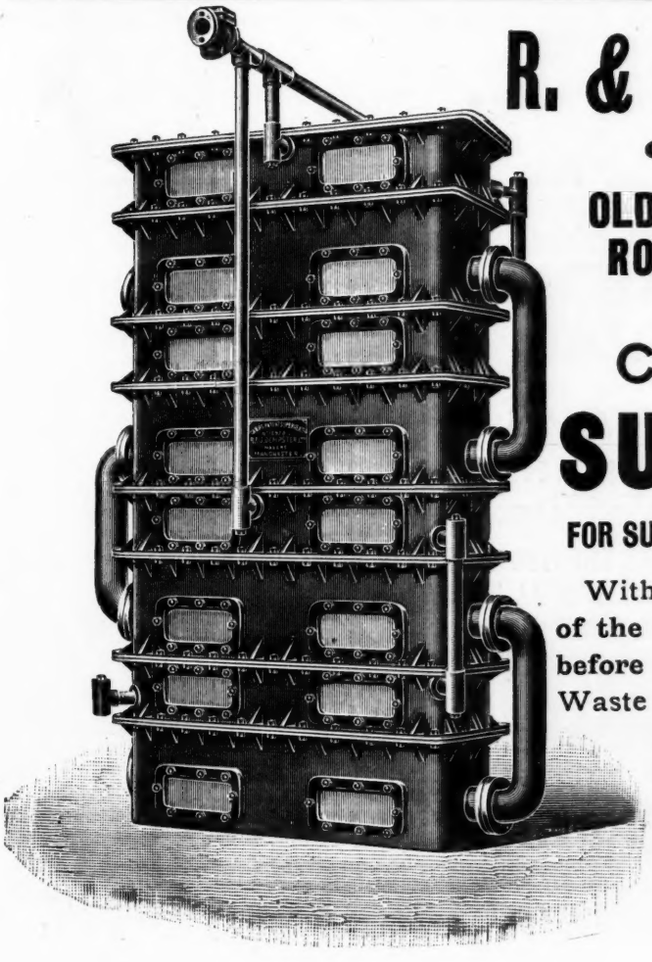

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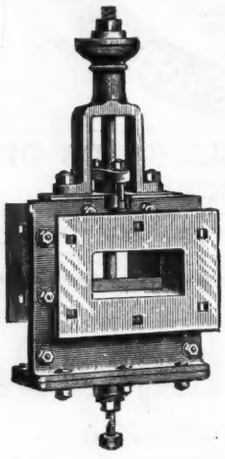

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